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THE AMERICAN GAS LIGHT JOURNAL

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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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[OFFICIAL NOTICE.]

Twenty-fourth Annual Meeting, Western Gas Association.

WESTERN GAS ASSOCIATION,
OFFICE OF THE SECRETARY,
NEW ALBANY, IND., April 8, 1901.

To the Members of the Western Gas Association: The 24th annual meeting of the Western Gas Association will be held in Louisville, Ky., May 15, 16 and 17, 1901, and will be called to order by the President, Mr. Ira C. Copley, of Aurora, Ills., at 9:30 A.M., Wednesday, May 15th.

The Galt House has been selected as headquarters, and the meetings will be held in a suitable room contained therein. The following rates have been obtained: European plan, $1.50 to $2 per day; American plan, $3 per day. Rooms with bath, from 50 cents to $2 per day, according to location. The Louisville Hotel offers similar rates. Sealbach's Hotel, European plan, $1 per day. It is especially suggested that those proposing to attend the meeting write well in advance for hotel accommodations, in order that certain comfort may be secured and assured.

The Executive Committee has arranged for the presentation of the following papers:

"Recuperative Furnaces of To-day: Directions for Operating and Testing;" by Mr. W. E. Steinwedell, Belleville, Ills.

"Six Months' Experience in the Operation of Inclined Retorts;" by Mr. A. H. Barret, Louisville, Ky.

"Taxation of Gas Companies;" by Mr. George McLean, Dubuque, Ia.

"Method of Keeping Prepayment Meter Accounts;" by Mr. Ernest Wm. Bell, St. Louis, Mo.

"Gas Association Libraries;" by Mr. F. H. Shelton, Phila., Pa.

"A Stormy Experience;" by Mr. John Gimper, Galveston, Tex.

"Gas and Hygiene;" by Mr. James Ferrier, Columbus, Ga.

"Wrinkle Department;" edited by Mr. F. H. Shelton, Phila., Pa.

"A "Short Topic" on the subject of "Isolated Generators for Bench Firing;" by Mr. Henry L. Doherty, Denver, Col.

Reports will be received from the Conference Committees on "Municipal Ownership" and the "National Bureau of Advertising."

The Western Passenger Association (from points in Eastern and trans-Missouri territories), the Central Passenger Association, the Trunk Line Association and the Southeastern Passenger Association have granted rates of 1 and ⅓ fare for the round trip, conditional on 100 certificates being presented to the Secretary for indorsement. The territory embraced by the above Associations includes all States east of the Mississippi river, except New England. The following States and Territories west of the Mississippi river are in the territory covered by the Railway Association granting reductions: North Dakota, South Dakota, Minnesota, Wisconsin, Iowa, Missouri, Nebraska, Kansas, Oklahoma, Indian Territory, Colorado and Utah.

All persons attending the meeting will purchase a first-class ticket at starting point, paying full fare for same, obtaining from agent a certificate stating that the person whose signature appears on same has purchased, at full tariff fare, 1 first class ticket to Louisville, which certificate, after it has been signed by the Secretary of the Association, and a representative of the above Passenger Associations, will entitle the purchaser to a ⅓ rate returning home.

Apply to ticket agent at least 30 minutes before departure of train. All station agents do not have a supply of certificates, but they can be obtained by request, if notification is made in time. Persons outside the territory embraced by Passenger Associations mentioned above should purchase a ticket to nearest point within one of said Association, and from there purchase a ticket to Louisville, obtaining a certificate, which will, if properly indorsed in Louisville, entitle them to ⅓ fare returning to place from which certificate was obtained, provided it is indorsed by a representative of the Passenger Associations (who will be present at the meeting) and the undersigned.

Those who live in Western Passenger Association territory should consult local agent several days in advance of purchasing ticket to Louisville, in order to reach an understanding with the different roads as to the junction point via which they will make rates applicable. Some local agents sell to junction points, where delegates can re-buy to destination. Certificates held by wives of the delegates attending the meeting will be honored in the same manner as those held by the delegates themselves.

Tickets can be purchased under the above arrangement on or after May 11, and are good, returning from Louisville, on or before May 21.

A banquet, to be provided by the Association, will be held Thursday evening, May 16, at the Galt House, tickets for which will be sold at $5 each. As it is necessary that arrangements for this banquet should be perfected at an early date, it is requested that those who expect to attend the meeting will notify the Secretary as early as possible of the number of tickets they will require. While the ladies will not participate in the banquet, ample arrangements will be made for their entertainment.

The calling of the roll this year will be omitted. Every member attending will deposit, upon entering the meeting room, a special card

which will be furnished him, and upon which he will write his name and address.

For the first time we are to meet in a city where the local gas company has in successful operation inclined retorts, which fact alone will be instructive and add to the interest of the meeting.

All queries sent to the Secretary for the Question Box will be assigned, in advance of the meeting, to members for answer.

The Secretary will be pleased to answer any communication pertaining to the meeting, and will mail blank applications to any who desire to become members of the Association. Jas. W. Dunbar, Secretary.

BRIEFLY TOLD.

The Western's Twenty-fourth Annual Meeting.—Secretary Dunbar's continued official announcement in the Journal respecting the 24th annual meeting of the Western Gas Association, should be sufficient, without further speech from us, to draw everyone interested in the gas business to its convention, that will assemble in Kentucky's "only" city in mid-May. Never was a fairer place than its dark ground for the blossoming of spring; never could be found a warmer welcome than shall be extended by those who will greet the Association and its guests. Not a thing has been neglected to assure the comfort and satisfaction of those who will take part in the sessions, either as delegates or guests; for if there is anything left undone that should have been done we are unacquainted with the personalities of Mr. Udolpho Snead and of Mr. A. H. Barret of the Louisville Gas Company. Apart from the foregoing, however, it might be well to remember that the Western Association meets for the second time in a city where the members may see for the first time the operation of a generating house, on the inclined retort principle, so far as that operating principle is concerned in American practice. Certainly we have another example of the plan in America—at the works of the King's County Gas and Illuminating Company, Brooklyn, N. Y.—but the Louisville one was the first; and with his usual open hardihood, Mr. Barret is willing, in the shape of a set paper, to relate the experience gained by him during 6 months in the operation of the new benches—and Barret always tells the truth, as some of the Hebrews heretofore interested in the Louisville Gas Company have learned. It is a pity that Mr. Byrne, of the King's County Company, could not compare notes with Mr. Barret over their relative trials and tribulations as to the preliminaries for getting to the end which both now have in view. A short few years from date they should both laugh at the slowness of their contemporaries; for, come what may to interfere with the progress of the plan, the inclined system of bench construction must prevail, if intelligent method of coal gas manufacture is to prevail—and that is what will prevail. The Western's paper list presents many available numbers from the point of interesting everyone that will attend; and not the least of them should be Mr. John Gimper's recital of "A Stormy Experience," whose troublous times in the up rising of the "Gulf" should not have been forgotten. President Copley, we suppose and hope, will have something to say about his European experience, and if to it he will add just a bit about the way gas matters are going along his lines in Illinois, that clever Yale gentleman will have put together an interesting document. Look over Secretary Dunbar's notification, remember its suggestions and go to the meeting. From this section we know that many will attend the Western's completion of its almost quarter century of useful life.

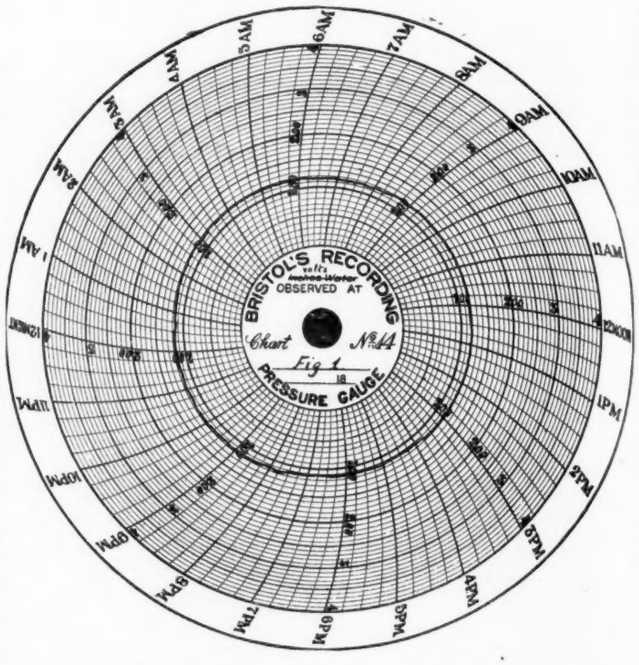
A Correction, but Not a Severe One.—These lines explain themselves: "On page 614 of the Journal (April 22d), you printed the greater part of that sent you by the writer in the matter of the gas for fuel question; but having observed a 'slight error' in the placing of a decimal point, I venture to address you again on the subject. Instead of costing 'his employers from to $500 to $5,000 in actual cash,' my figures were meant from $5,000 to $50,000 in cash; and such is a very conservative estimate at that of what it has and does frequently cost a gas company that never reckons the cost of experience as worth anything. You might also add this 'a.b.c.' to my foregoing comment, and in it I think is embraced sufficient matter to give to the young, and to some of the old men of all the Gas Associations in the world, plenty to work upon: (A.) Applied science, through practice, teaches us that when solid fuel is burned in the ordinary way we obtain only about 10 to 15 per cent. of its demonstrable value in heat units. (B.) When solid fuel is converted into gas, and then used as fuel, we can recover from 55 to 80 per cent. of the above named value, provided the gas is applied in a suitable manner—in many instances that is being done. (C.) The cost of converting solid into gaseous fuel is equal to about 20 per cent. of the first cost of the former."

[Prepared for the Journal.]

Gas Distribution as Viewed by an Electrical Man.

By Hubert S. Wynkoop, M.E.

A variation of 10 per cent. in the pressure throughout the mains of an electric distribution system, or a variation of the same amount at different times at any one point on such a system, would call down upon the management the condemnation of electrical engineers and consumers alike; and, as a matter of fact, such undesirable conditions are infrequently realized in practice. Granting this statement to be accurate, and assuming a normal pressure of 115 volts, it is a simple matter to construct a conventional diagram (Fig. 1) which shall represent the extreme limits of variation from the standard pressure during the 24 hours on any well designed electric system.

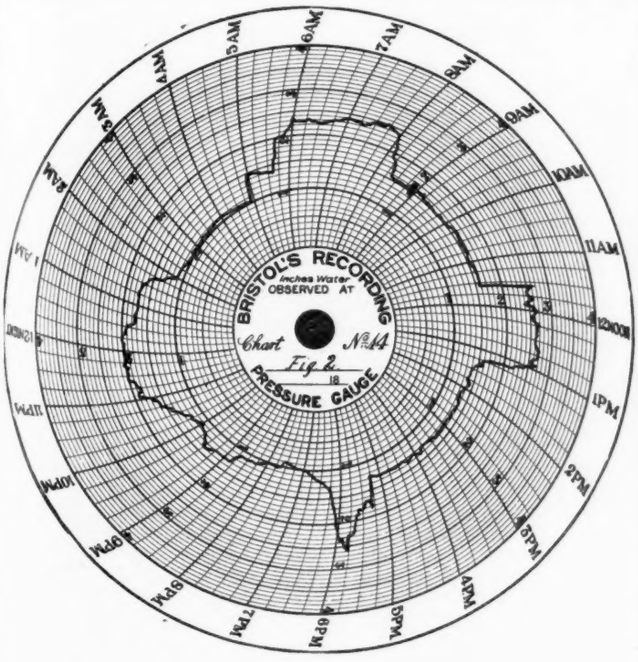


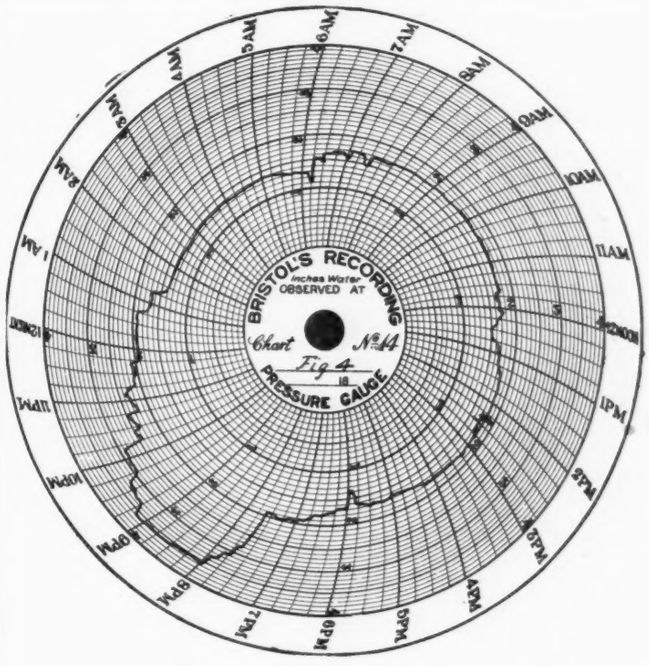
Turning now to gas distribution, we obtain results widely at variance with those of electrical practice, and it is interesting to note the discrepancy, to determine why it exists and to prescribe a remedy.

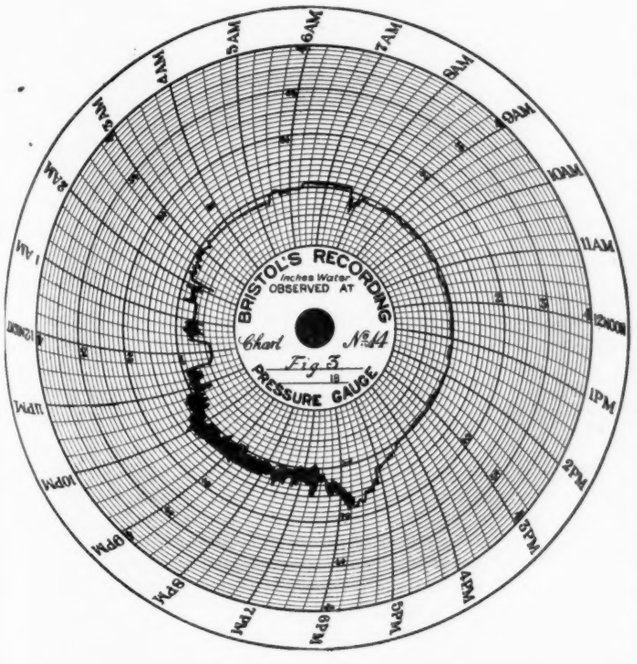
It becomes necessary at the outset to fix upon a standard or normal pressure. Gas engineers—so far as they have placed themselves on record on this point—do not agree. Personally, I am perfectly satisfied to have my gas delivered at the meter at a minimum of 11-tenths of an inch (water) pressure; but that value might not prove sufficient in case the supply were intended for a large hall, where the loss in pressure, or "drop," in long lines of piping might reduce the 11 tenths at the meter to half that amount at the burners. For this reason, therefore, and also to cover cases of improper or rust-clogged piping in residences, it has seemed advisable to assume a normal of 15 tenths. This figure allows a drop of 50 per cent. between the meter and the gas consuming appliances—surely a sufficient allowance.

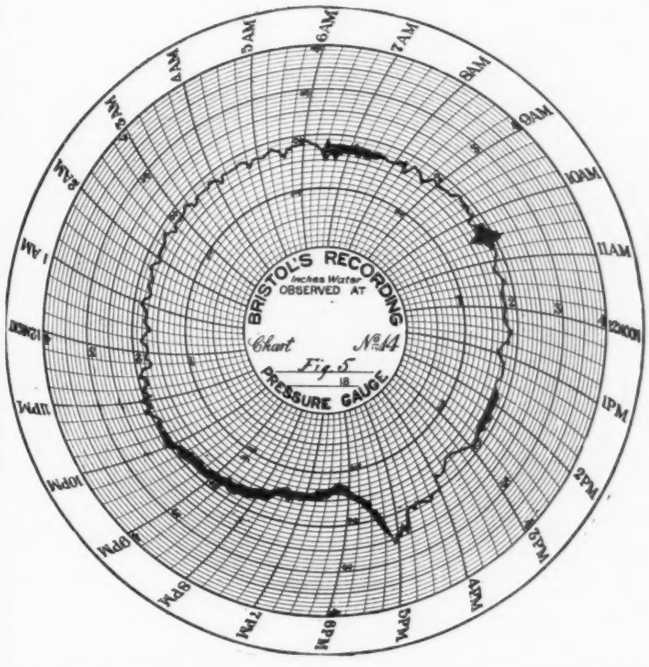
Fig. 2 shows a record of pressure on an old, and heavily overloaded, main situated about 3 miles from the works and in a residential district. At the point from which this card comes it is impossible to operate gas burners of any description with satisfactory results without resorting to a regulator. The ranging of the pressure, from 40 per cent. below to 80 per cent. above the normal, precludes any attempt at successful permanent adjustment of the burners.

Fig. 3 represents the pressure on an old and overloaded main within a mile of the works, the main in question being in a business district. The range is almost entirely on the minus side of the normal, and this could have been forgiven readily, owing to the steadiness of the pressure during the greater part of the day, were it not for the extremely low pressure existing during the midnight hours—a period usually free from heavy loading. The most plausible explanation of the low pressure is that the gas company intentionally reduced the pressure at 11 o'clock in the evening, in order to decrease leakage from the mains. Night after night I have observed at my own residence this sudden lower-









ing of pressure, always at about 11 o'clock, except on Saturdays, when it occurs nearly an hour later.

It is to be regretted that investigation was not made of the cause of the rapid fluctuations of pressure during the night hours. Condensation in the pipes, as the result of frosty weather, may have caused the variations, or the mere lowness of the pressure may have contributed to its own unsteadiness. As was to have been expected, the unanimous complaint of the neighborhood was of "poor" gas after 10 o'clock. The range of pressure is from 75 per cent. below to 20 per cent. above the normal.

At a point within a quarter of a mile of the works Fig. 4 was secured. It is noteworthy chiefly on account of the extremely high values of the pressure; for while, at times, the pressure falls to 30 per cent. below the normal, the average minus percentage during 5 hours is about 10, the percentage during the other 19 hours being plus and running as high as 140. No complaints of inferior illuminating power originated in this district.

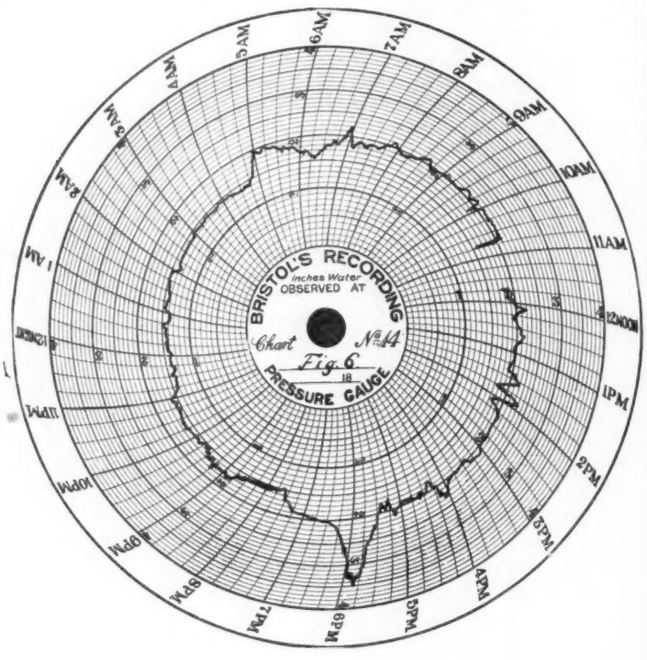
Fig. 5 records the pressure conditions existing 1½ miles from the works; minimum, 20 per cent. below; maximum, 70 per cent. above the normal.

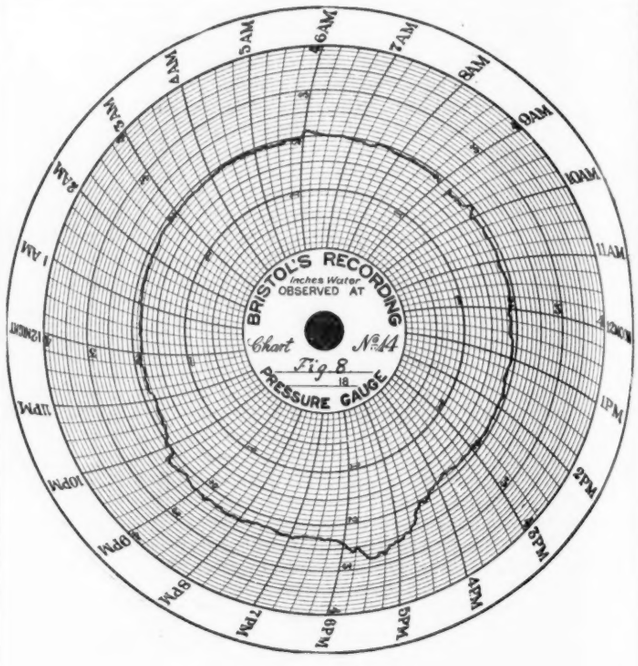
Fig. 6 came from a point ½ a mile from the works; minimum, 10 per cent. below; maximum, 133 per cent. above.

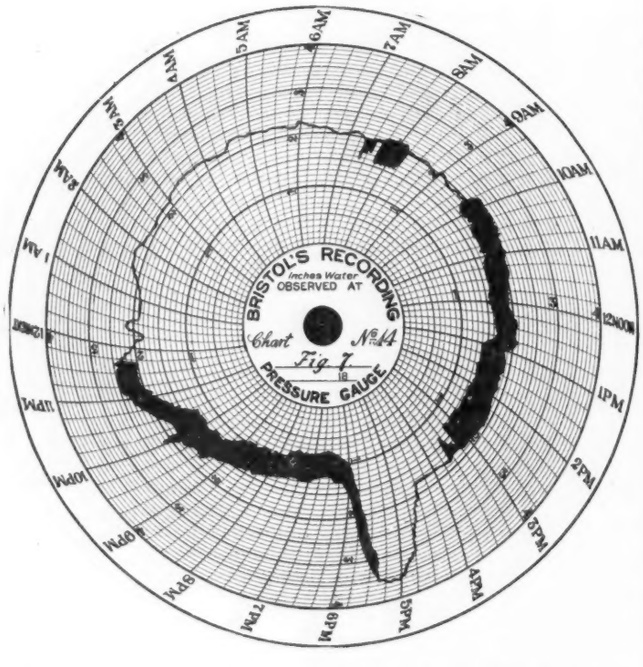
Fig. 7 is introduced to illustrate the vagaries to which the pointer sometimes responds. Were there not positive information to the contrary, it would be proper to assume that the gauge had been attached to some flimsy partition that was violently and incessantly jarred by the slamming of a door. The minus percentage is 25; the plus percentage, 140.

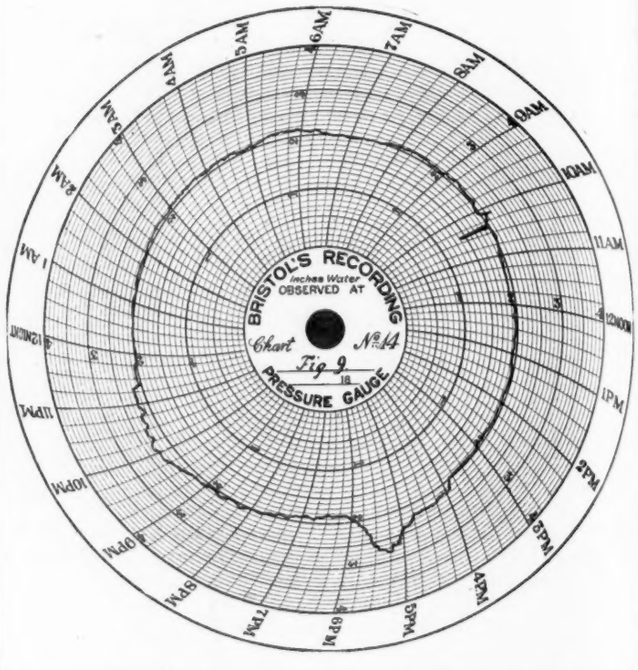
Fig. 8 exhibits a pleasing uniformity, with no variation whatever below the normal, and a plus percentage of 87. If, in this instance we assume a normal of 20-tenths, instead of 15, the range becomes 10 per cent. below and 40 above—an unusually close regulation for gas systems, the unsatisfactory feature being the high pressure values.

Another example of reasonably uniform pressure is to be found in Fig. 9, which, like Fig. 8, came from a point about a mile from the works, but in a different direction. The pressure is at all times above the normal, and the maximum is 87 per cent. above. Assuming, as before, a normal of 20-tenths, the range is found to lie within minus 7 and plus 40 per cent.









Now, the most curious fact connected with the gas distribution thus recorded is the complacency with which gas engineers to whom I have shown the diagrams regard the conditions thereon portrayed. With the exception of the very low pressures indicated on Figs. 3 and 7, all of the cards are in every respect satisfactory—to the gas engineer. But they cannot fail to prove disappointing to the consumer when he is made to realize that they carry the secret of his "poor" gas; for the average illuminating power of the gas throughout the territory under discussion has been found to be 23½ candles.

The reason for the apparent apathy on the part of the gas management may or may not be found in the following list:

1. Because gas is a necessity, and the public—though it grumble—will continue to buy the product as at present distributed.

2. Because raising the pressure at the works entails an increased leakage, which has no financial counterbalance in the cessation of complaints of "poor" gas from remote districts; nor would the increased pressure insure *evenness*—merely a *sufficiency*.

3. Because the substitution of larger mains would involve a great monetary outlay.

4. Because the addition of feeder piping and district governors would involve a great monetary outlay, and an increased maintenance charge.

5. Because the introduction of house to house governors would cost $4 or $5 per house, an expense that would probably have to be borne by the company, inasmuch as the consumer might object to having it added to his meter deposit; nor would the governor prove of any use for the correction of troubles arising from *under* pressure.

6. Because the public is clamoring for cheaper gas, always *cheaper* gas; and it behooves a large corporation to cater to the wishes of the public. When consumers become educated up to the point of demanding *better pressure regulation*, it will be time enough to consider seriously an improved system of distribution.

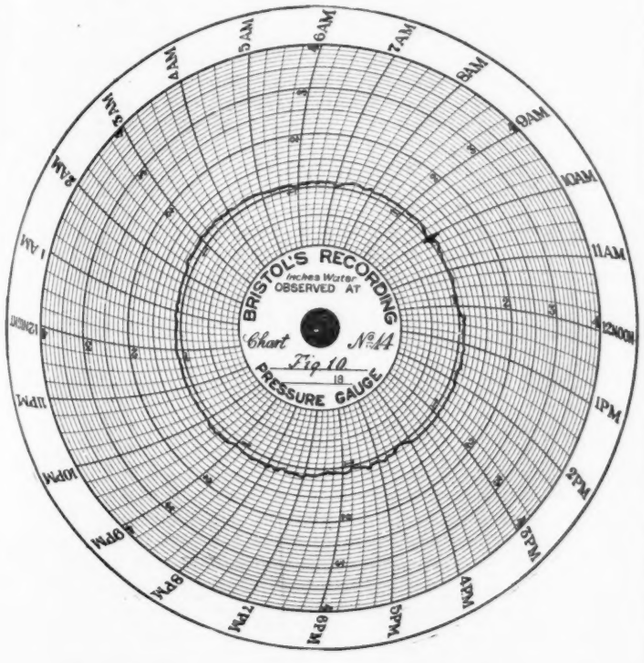
[The reader will undoubtedly add to this list some pertinent arguments of his own.]

Undeniably, there must be a definite pressure at which gas consumption attains its highest efficiency when ordinary appliances are employed; and this pressure must be nearly coincident with that pressure which gives the most satisfactory service. Assuming that

these two pressures coincide, the consumer is entitled to receive his gas at this pressure—and at no other. Theoretically, this is true; commercially, a certain variation from the normal must be permitted, the amount of which might fairly be regulated by law.

Should the expense of redistributing and augmenting the present faulty distribution be deemed prohibitive, it is possible to resort to district governors or to individual governors. The cost of installing house-to house governors in a solidly built up section may be estimated at between 50 and 60 cents a linear foot of street—an insignificant amount, if applied to trenching, piping, laying and repaving.

I am inclined to favor the introduction of these house-to house governors in connection with which Fig. 10 deserves special mention.



It was obtained from the same point as Fig. 2, but at a later date. During the interim no change was made in the street main in the immediate vicinity, nor was any alteration made to the service pipe. The governor was adjusted to maintain a pressure of 11-tenths, and—when one considers that it is merely a throttling device—it appears to have performed its function very well. The variation in pressure does not exceed 10 per cent. in either direction from the normal at any time, which is a near approach to the close regulation usual in electrical systems (Fig. 1).

By the use of this governor I am now doing for myself, and at my own expense, that which the gas company fails to do for me. I am thus practically independent of the gas company as long as the pressure on the mains is equal to or in excess of the value at which the governor is set, but I am entirely at the mercy of the street pressure on those somewhat rare occasions when the pressure in the mains drops below 11 tenths.

But the important matter is, after all, to direct the attention of laymen to the present faulty methods of distributing gas, rather than to exploit some particular appliance intended to improve existing conditions; to create a healthy public sentiment in the right direction, rather than to encourage impotent discontent. It is not material to the consumer in what manner relief be secured; *that* may be left to the gas engineer. Nor is it imperative that gas should be furnished at a lower rate per 1,000 cubic feet; for such reduction in price would inevitably result in delaying those improvements which our recording gauge shows to be necessary.

THE San Francisco *Chronicle*, of April 26th, said: "The San Francisco Gas and Electric Company is making ready for its anticipated struggle with Claus Spreckels' Independent Gas Company, which is announced to commence operation on or soon after January 1st, 1902. The first preparatory act of the old Company was the reduction of the dividends payable May 1st, June 1st, and July 1st, from 30 cents to 25 cents a share. Its next move will be the suspension of dividends altogether, beginning August 1st."

Address of the President (Mr. J. F. Strickland) on the Occasion of the Third Annual Meeting of the Southwestern Gas, Electric and Street Railway Association.

Gentlemen of the Convention: It is with pleasure that I greet you one and all to this, our 3d annual meeting. As your President I have nothing special to report to you, neither have I anything special to address you on; but I will take the liberty to make some comments and possibly some suggestions.

First, I will say that perfect harmony reigns supreme throughout our entire organization. The various committees appointed at the Waco meeting have done good work, and have shown by their actions that they had the interest of the Association at heart as will be proved by the reports from them at this meeting. I also congratulate you on the election of Mr. Stewart, at Waco, as Secretary, and as your President I most heartily thank him for his very efficient work.

I am proud to note that a wave of prosperity has been passing over the entire country since our last meeting, reaching from the Atlantic to the Pacific, and from the Great Lakes to the Gulf, with an apparently inexhaustible fountain (of petroleum oil) less than 100 miles from this city. And while this great gusher is on, some of the members of our Association no doubt, as well as the Association, have enjoyed many of the benefits.

Our membership has increased and our field has grown larger, and in this connection I will say there is much work to be done looking to a further increase in membership. Why shouldn't we have a membership of from 300 to 500? There is only one answer, and that is, "We should." This coming year should be made one of aggression, both by our officers and members. Each and every member can help in this work.

We have a strong list of papers to be presented at this meeting, and a glance at the programme will satisfy each of you, having a personal acquaintance with the writers, that each subject has been ably investigated and considered; therefore, a mutual and lasting benefit should be derived by us all through being present at this convention; and I urge upon you the importance of giving strict attention to the reading of these papers.

The gentlemen presenting them expect your criticism and solicit your inquiry upon any points made by them that you may differ with them, or that you may not understand. These subjects were selected and assigned by your Directory, specially because of the fitness of the individual gentlemen to deal with the respective subject, and because of the broad area for the mind in each subject.

Who is it that is not interested in "Municipal Ownership of Public Utilities?" Whether he is an investor in such properties or a politician, we are all loyal to our country, and whatever is to our country's good is to our good, and a discussion of this subject cannot fail to be beneficial to the one general interest.

"Association Work between Meetings," will be of special interest to the members of the Association, also to prospective members; and your President feels specially proud of this paper, because it is the first one ever presented to the Association by an Honorary Member. It demonstrates the fact that interest in our work reaches far out beyond the confines of active membership.

"Station Work" interests us mechanically and electrically; in fact, it gives us a shock that reaches from the fuel stock to the bank account. Hence we are all directly interested.

"A Corporation and Its Employees." The lines of interest on this subject are boundless. Who are affected by strikes? Corporations and the people. Who compose the corporations? The people. Then all are affected, so the subject becomes of mutual interest, both to the people and to the corporations, hence discussion along this line should produce good.

"The Street Railways of Texas," is a subject of special interest, because of the varied trials and tribulations of the street railway men of the Lone Star State, and the history connected therewith, with the precedents established and those that are daily being made. We may expect much good from this paper.

"Inspection" is a very important subject and will be ably dealt with. Something along this line in the way of concert of action should be taken up, and efficient men only should be given responsible positions such as are intimately connected with danger to life and property.

"What Are We Here For?" is a proposition that we may put to ourselves in our everyday walks of life, in the Association and elsewhere. I pass it for the writer, or some other able mind, to answer.

"Electrical Pot Pourri." No man, from Davy, Franklin, Faraday,

and others of early fame to the present time, including our Edison and Tesla, has been able to tell what electricity is nor what is in it; but, as we have heard said about the Washington pie, it may be said about electricity, that no one except God and the baker know what is in it. We suppose that a like statement will apply to the "Electrical Pot Pourri;" that is, no one knows what is in it save God and the writer, for it is a subject of the author's own selection.

"Cheap Fuel and How to Use It," is a subject that interests us all, even though you have water power; simply because it is good in that case to have an auxiliary steam plant to guarantee uniform service. Not an individual in the entire country that has a dollar's interest where fuel is burnt, or that is indirectly interested in the same, but will be interested in this paper.

"Water Power for Small Plants." While there are not so many of us interested in this subject, yet there are those of us who are specially interested, for which reason it becomes an important subject.

After letting your mind pass rapidly over the various subjects to be discussed at this meeting, you are at once ready to admit that there is yet a vast expanse for the mind to explore and an undeveloped territory in which work is to be done. The struggle for supremacy, mechanically, electrically and scientifically, has hardly begun.

I thank you for your courtesies and indulgence.

Municipal Ownership vs. Private Corporations.

[A paper read by Mr. Thomas D. Miller, at the Third Annual Meeting of the Southwestern Gas, Electric and Street Railway Association.]

The subject of municipal ownership is one that has attracted more general attention throughout this country in the past few years than almost any other municipal policy that has engaged the profundity of the ward politician, and it has also attracted the attention of some eminent politico-economists, both pro and con. It is not the purpose of this paper to attempt to settle this question, but to provoke a discussion of it in the hope of arriving at a more settled conclusion as to the best remedy for the evil; for I am convinced that evil it is.

The spirit of our government is freedom and government by the people to be governed; and while I believe it to be the best form of government in the word, it has its thorn to accompany its rose. Corruption, the result of personal greed of gain and political preferment, will meet its rebuke at the hands of the suffragists, but unfortunately the rebuke does not come until there has been ruinous loss to both public and private funds, and this constitutes the principal danger from the municipal ownership delirium. City ownership or control of gas works in some European countries has been in the public eye for many years.

The cause of success of municipal ownership in European cities and of failure in this country cannot certainly be traced to superior ability of the people over on the other side, or in different qualifications to those here, but to the selection of the men who have the work in hand; and this selection of such men is as different under our form of government as is our form of government different from that of the European cities referred to.

The statement that there is not a city government in the country that is run on the same business principles and by the same business methods that successful enterprises of the same magnitude are conducted, is made by parties who are well informed and competent to judge, and while there may be exceptions, they are only numerous enough to proverbially prove the rule. The reasons for this are obvious.

With different success in the management of the ordinary affairs of a city, how can it be expected that success will be assured in the management of an enterprise requiring special training and experience, and which business is subject to a great variety of vicissitudes known only to the initiated.

Mr. M. J. Francisco, in an address before the League of American Municipalities, said: "The functions of a municipality are to govern and regulate. It is a well established axiom that to govern and regulate successfully requires that one shall be wholly disinterested, while ownership implies the greatest self interest. In municipal ownership, therefore, we have two propositions that are directly antagonistic."

In the same address Judge Dillon is thus quoted: "The legislature should be prohibited from allowing municipal corporations to engage in extra municipal projects, or to incur debts or levy taxes for such purposes. * * * Their chief function should be to regulate and govern. To invest them with powers of individuals or private corporations, for objects not pertaining to municipal rule, is to pervert the institution from its legitimate ends and to require of it duties it is not adapted satisfactorily to execute."

As a regulator of prices, competition has proven a failure, excepting for a few years, in any one place, and invariably has resulted in disaster to the investments and higher prices to the consumers. The semi-public corporation has not only the ordinary exigencies of business to contend with, but an additional uncertainty to provide for in the possible attacks of municipal authorities, in various ways. The inviting of competition because of dissatisfaction with existing concerns, attack of franchise privileges, excessive and burdensome taxes and numerous other methods of annoyance, and whether successfully applied or not are expensive to meet or combat, and all must come out of the earnings.

On February 27th, 1901, Mr. L. N. Case, Manager of the Water and Light Department of Duluth, Minn., read a paper on "Municipal Ownership," before the Economic Club of Duluth—an enthusiastic defense—which he opens thus: "Almost the first of my preparatory thoughts preceding the preparation of this paper was the perfect applicability to my condition of the expression, 'Out of the abundance of the heart the mouth speaketh;'" and he might have added, "Where man's treasure is there will his heart be also," for in the same paragraph he says that he has been in the employ of municipal plants for 35 years. Verily, brother Case is a great politician to have held on so well, or his municipal plant has had mighty little politics mixed up in it, and he has had the good fortune to have his abilities recognized and rewarded.

In fact, in closing the paper he says: "These results are but the results of municipal ownership, untrammeled by political influences and operated on business principles alone;" and then, as a final compliment to himself and to the honor of the mayors and councils, he adds: "Not one single official act, or attempt at an act, has been done or made, that was in any way calculated to interfere with the administration of the affairs of the department upon the above principles." Who would not be an advocate of municipal ownership under such circumstances? No private corporation ownership advocate ever said that municipal ownership would be a failure under such circumstances. The whole point emphasizes the very argument always advanced against municipal ownership, that such business administration of its affairs could not be obtained, and history proves the correctness of the statement. Mr. Case further says: "I am free to admit that there have been failures in municipal ownership, because of corruption of politics, the spoils system, and the imcompetency resulting therefrom;" and, therefore, is no logical argument against it, so he says. Then Glasgow is quoted as an example of successful ownership of public utilities, as well as a large number of tenement houses; but he bucks at the ownership of the houses on the ground that it is in violation of the correct principles of municipal ownership. When it is "necessary to occupy the public property of a people in order to carry on a business, that business should be owned and operated by the people; and that the people, as such, should not engage in any business that requires only the occupation of private property, and which can be maintained by private enterprises and private capital." Can one imagine a business involving the handling of a commodity which does not occupy and use the public property in its distribution? Carrying out this idea the city would be justified in going into the supply of food stuffs, for they are necessities, and the public property (streets) is used in their distribution, and so *ad infinitum*.

The streets are the property of the people, and for their use and such use as they choose to make of them as long as individual or public rights and privileges are not infringed. The humblest citizen has the same right to walk the streets undisturbed as the nabob to drive his tallyho, and yet the one who makes elaborate use of the streets is not called upon to pay for a special privilege, nor is the one who uses them the least of all relieved of any part of a special tax because of his failure to use them. The mains of gas companies, electric companies and the lines of street car companies are for the public use, and such use as each individual citizen chooses to make of them, so long as he does not infringe on individual or public rights, just the same as streets are at his service.

It would be superfluous to argue further on this part, for I take it you all agree with me that it is bad policy for municipaiities to own and operate lighting plants. I also take it for granted that you all clearly see that this subject is in the saddle in almost every community large enough to warrant the installation of a lighting plant, and that the issue has to be met in one way or another.

It is obviously unjust to tax all the people for the maintenance of public utilities, such as gas or electric plants, for supplying private uses

when only a fraction of all the people use these commodities; and it is just as obviously unfair to tax these users of such utilities for the benefit of all. The franchise tax or bonus is just such a tax on the consumers, and the municipal plant operating on a basis of revenue equal to ex penses is the other form of tax on the non-consumer, for they are deprived of the benefit of the taxes that would have been paid by a private corporation doing the same business. How much more apparent, then, when there is a tax levied to pay sinking fund and even interest on bonds issued to pay for the plant!

The special power granted to several cities in the State of Texas, to regulate prices of gas and electric current, places the authorities in the attitude of arbitrators specially interested in the results of the arbitra tration. If the arbitrator is avowed in the interest of the dear people, to the hurt of the corporation, he is actuated by prejudice or political motives; if another be striving for an equitable adjustment, his opponent will attempt to whip him into his line with the charge of being a henchman of the corporation and opposed to the interest of the people. While it is possible to get just adjustment of rates under such conditions, it is not possible to know that you have any security from read justment with each new administration.

Where the demand for municipal ownership fails to carry before the people, the city gets from the legislature the power to regulate service and prices, and at the last session of our legislature a bill was introduced to give all cities and towns the right to regulate the price of all commodities in the distribution of which the public streets were used; and while the bill failed to pass the committee on *cities* and *towns*, it shows the tendency of some of our officials.

These are the horns of the dilemma. Municipal ownership on one hand and local control and regulation of prices on the other, and if this latter power is arbitrarily exercised your only relief is in the courts at considerable expense, annoyance and public criticism and its accompanying evils.

The exercise of the former power can bring but one of two results; retirement from business by the forced sale of your property, or ruinous competition and practical bankruptcy.

If the power to regulate prices must be given to public authorities, would it not be far preferable for that authority to be vested in a small body of men whose duty will be to make a specialty of their work, and who will have authority to make investigations of all complaints, be they from citizens, municipality or private corporation, and render decision thereon.

A commission, if you please, whose members shall be State officers, and with power to say to the various companies throughout the State, as long as you furnish adequate service at reasonable prices, based upon a fair earning capacity on your investment, you will be immune from competition and harrasment from local authorities.

Is such a commission practicable? Massachusetts has such a body, and it has been exercising its functions for the past 16 years; and, so far as I can learn, its operation has been eminently satisfactory to both the public and the corporations.

Such a commission becomes arbitrator for all questions raised by the municipality, the individual or the corporation.

It is argued that the element of politics enters here also. True; but has not a large element been eliminated in that your commission cannot be directly interested locally in every city and town in the State, and if selections were made from different parts of the State, and the fitness to fill the positions were made the paramount consideration, would not the commission be better than the condition that is rapidly being thrust upon us?

The Change Occurring in the Illuminative Value of Mantles with Lapse of Time.[1]

By Dr. Emil Liebenthal, of Charlottenburg.

[A paper presented to last year's meeting of the German Association of Gas and Water Engineers at Mayence, and subsequently to the International Gas Congress at Paris as a supplement to Dr. Bunte's paper on "Incandescent Gas Lighting." It is included in the recently issued "Compte Rendu" of the Congress.]

The foremost position occupied by Germany in the industry of incandescent gas lighting, has rendered it desirable that experiments should be made in that country on the incandescent gas light, with a view to determining the duty afforded by the different varieties. These experiments ought to be as numerous as possible, and strictly comparable. At Dr. Bunte's suggestion, therefore, the German Association of Gas and Water Engineers, in April, 1899, communicated with the Imperial Physical-Technical Institute, which gladly consented to co operate in such experiments, having regard to their general public interest. In October, 1899, a meeting of a committee, consisting of members of the Association and representatives of the Institute, took place at the Institute at Charlottenburg, under the chairmanship of Herr Hagen. At that meeting, a number of conclusions were arrived at as to the projected testings; and of these, the most important ones bearing on the report of the results obtained up to the present time are the following: The investigations in the first place were to be only for purely instructive purposes, and were to relate only to determining the intensity of the light and the ash contained in the mantle, and not to durability. Secrecy was to be preserved as to the manufacturers. Members of the Committee had to procure the required mantles privately through trustworthy persons, and had to be sure that the best quality was obtained in each case, as for the most part firms supply several qualities. Five firms, who supply approximately 75 per cent. of all the mantles made in Germany, were selected for the first series of tests. Two groups of less important firms are to be dealt with later.

The photometrical testing was assigned to (1) the Charlottenburg Imperial Institute; (2) Dr. Bunte; (3) Herr Drehschmidt; (4) Herren Krüss and Leybold; and (5) Herr Schäfer. The determination of the ash of the mantles was entrusted to the first three of these observers.

For both these investigations 4 mantles were employed at each place. Herr Schäfer was commissioned to procure the necessary apparatus for burning off by means of gas under high pressure, and, in collaboration with Herr Drehschmidt, to prescribe the pressure to be used and the duration of the hardening process. Welsbach ("Auer") burners were employed, with 25 cm. [nearly 10 inch] Jena glass chimneys, for the testings. Magnesia props 70 mm. (2¾ inches) long, measured from the upper edge of the burner to the lowest part of the fork, were used. The average horizontal intensity of the light was found by measurements in ten directions. As sources of light for the comparisons, incandescent electric lamps were used, or where their use was impossible, "jewel" burners.

Only mantles free from blemishes, and fitting closely round the burner, were used in the testings. Any mantle which showed at the outset a difference of more than 15 per cent. between the maximum and minimum readings in the ten directions was discarded at once, because of its great want of equality. Mantles which suffered injury during testing were replaced by others. The photometrical tests were made after the first hour, after 24 hours, and again after 100 and 300 hours' use. Tests were not to be made at over 300 hours, as the inensity of the light diminishes but little after this time; and it was not intended to test the durability of the mantles. The pressure of gas employed was between 30 and 35 mm. (12 to 14-tenths nearly), and the rate of consumption between 100 and 125 liters (3.53 to 4.41 cubic feet) per hour.

Within these limits, gradual enlargement of the holes of the nipples, or selecting a nipple out of 5 or 6 different ones, was resorted to in a preliminary trial of each mantle on the photometer, in order to secure the highest absolute intensity of light (not the highest degree of economy). Every subsequent photometric observation was carried out with the use of the appropriate nipple under two conditions—viz., first with the pressure used in the preliminary trial, and secondly with the greatest intensity of light attainable by turning the tap (diminishing pressure). In addition, the gas used was tested by means of a hollow-top burner at a consumption of 5.3 cubic feet per hour; and a determination of its calorific power was also made by means of Junkers' calorimeter. The results of testings had to be communicated to the Charlottenburg Institute as soon as possible.

These conclusions as to the manner of conducting the testings having been arrived at, Professor Bunte forwarded mantles in November, 1899, and Herr Schäfer the burning off apparatus in December, 1899, to the different observers; but the hollow top burners, and the directions for burning off, were not sent until 4 weeks later, whereupon the testings were begun. Three observers have sent in their results; and the Charlottenburg Institute was thus put in the position to work out the results obtained at 4 places. The measurements made at the highest intensity of light obtainable, after the periods of use agreed upon, gave the values which are collected in Table I., for the absolute intensity of light, and the consumption of gas per hour per candle. [The values in the original are stated in Hefner units; the values given in the following tables, etc., are calculated therefrom on the assumption that 1 Hefner unit = 0.877 English candle.]

1. *Journal of Gas Lighting.*

Table I.

Description of Mantle.	Absolute Intensity of Light in English Candles, after Use for—				Cubic Feet of Gas Consumed per Hour per Candle, after Use for—			
	1 Hr.	24 Hrs.	100 Hrs.	300 Hrs.	1 Hr.	24 Hrs.	100 Hrs.	300 Hrs.
A	81	74	61	53	0.052	0.056	0.068	0.076
B	75	68	58	53	0.056	0.060	0.072	0.076
C	75½	74½	69	67	0.056	0.056	0.060	0.060
D	73	70	63	56	0.056	0.060	0.064	0.072
E	65	65	60	53	0.064	0.064	0.068	0.076

These numbers are the means of the values found by the different observers—that is to say, means of 16 values. The results of the observers were in close agreement. The different makes of mantles are indicated by the letters "A" to "E," in order to preserve secrecy as to their actual origin.

At the start, therefore, mantles "A" gave the highest intensity—viz., 81 candles; then came "C," "B" and "D," with about 75 candles; and lastly "E," with 65 candles. After 300 hours' use, "C" gave 67 candles; while the other makes had fallen off to about 53. With regard to the consumption of gas per candle hour, make "A" started best of all, with only 0.052 cubic foot; then came "B," "C" and "D" makes, with 0.056 cubic foot; and, lastly, "E," with 0.064 cubic foot. But at the end of the trial, the consumption per candle hour had risen to 0.076 cubic foot for "A," "B" and "E," and 0.072 cubic foot for "D;" while for "C" it was only 0.064 cubic foot. These results indicate that at the end of 300 burning hours, the light afforded had diminished for the different makes by about A, 35; B, 28; C, 12; D, 23; and E, 19 per cent. of the initial intensity; or 29, 22, 11, 20 and 19 per cent. of the light found after 24 hours' use.

The 5 makes afforded throughout the 300 hours an average light at an average gas consumption per candle hour as follows:

	A.	B.	C.	D.	E.	Mean of all Makes.
Light, candles.	66½	58	69	61	58	61
Cubic ft. consumed per candle hour	0.068	0.072	0.060	0.064	0.072	0.068

The investigations, made throughout at the highest intensity obtainable under the conditions prescribed, showed the most favorable results for "C" mantles. The readings made at the pressure of the initial testing show, as was to be expected, values for the light at the end of 300 hours' use about 5 per cent. lower than those recorded above, and the consumption per candle hour about 17 per cent. greater. The total consumption of gas per hour was about 4.24 cubic feet as an average of the 5 makes used under these conditions. These figures, however, were not closely investigated, as the primary object of the tests was to determine the duty afforded by the mantles.

In order to obtain information as to the subsequent behavior of the mantles, the Charlottenburg Institute allowed the best and the worst of each make to burn for 300 hours longer—or, in all, 600 hours. The following table gives the results of these testings, which were made at the maximum intensity under the conditions laid down:

Table II.

Description of Mantle.	Absolute Intensity of Light in English Candles after Use for—					Cubic Feet of Gas Consumed per Candle Hour after Use for—				
	1 Hr.	24 Hrs.	100 Hrs.	300 Hrs.	600 Hrs.	1 Hr.	24 Hrs.	100 Hrs.	300 Hrs.	600 Hrs.
A	77	70	58	51	47	0 056	0.060	0.072	0.076	0 081
B	74	68	55	53	45	0.056	0.060	0.072	0 072	0.085
C	74½	75½	72	72	69	0 056	0.056	0.060	0.056	0.056
D	77	72	62	56	56	0.056	0.060	0.064	0.064	0.063
E	67	65	57	53	52	0.064	0.068	0.072	0.072	0.072

With the exception of make "B," which showed a marked deterioration, the light and consumption remained nearly constant between 300 and 600 hours; and therefore a period of 300 hours' use appears to be sufficient for comparative trials of this kind.

A fresh investigation, extending likewise to 600 hours, made by the Charlottenburg Institute with two other mantles which were purchased privately about the middle of February, 1900, through a trustworthy man from the firm "C" led to nearly the same results as are shown in Table II. The "C" mantle had again proved the best in these trials extending to 600 hours. It should, however, be mentioned that quite recently the Institute obtained one specimen of another description of mantle, which was found to surpass "C" in illuminating power, and to be about as good, so far as constancy was concerned. The light afforded by it after 300, 1,000 and 1,500 hours' use was only about 11, 13 and 19 per cent. respectively less than its initial intensity.

With regard to the general conditions of the investigations, it is to be observed that:

1. The illuminating power with the hollow-top burner was found to vary greatly with the different observers—viz., from 7.2 to 12.5 candles (at 5.3 cubic feet per hour).

2. On the other hand, the calorific power of the gas at the different places where the observations were made did not vary greatly; the extreme values being 137 and 154 calories per cubic foot. From this it would seem that at the present time, when flat flame and Argand burners are being displaced by incandescent burners, gas works generally should attach less importance to the production of a highly illuminating gas than to that of a gas with as high and uniform a heating value as possible. The generally good agreement between the results obtained by the different observers is to be ascribed to the calorific value of the gas used being in all cases nearly the same.

3. The determinations of the ash left when the unburnt-off mantles were incinerated gave the following percentage: A, 17; B, 15; C, 11; D, 14, and E, 19. Consequently, make "C" gave the smallest proportion of ash, and make "E" the greatest.

4. The descriptions "B" and "C" kept their shapes well; but the others contracted rather badly near the top and above the edge of the burner.

In conclusion, it is necessary to emphasize the fact that the investigations described are intended only to afford a glance at the present position of the incandescent lighting industry, and to allow conclusions to be drawn as to what is at the present day to be required of a mantle. They ought to impel the manufacturers to attempt still further improvements. Decisive opinions on the matter must not be given until the testings have been multiplied. It was indicated to the committee that firms might by accident send out inferior mantles; and this appears to have happened, judging from some results obtained by two observers. But the experiments have shown that the industry has already succeeded in producing mantles which give a reasonably high initial illuminating power, and show but a comparatively small diminution thereof in the course of at least 600 hours' use. An early continuation of the investigations is urgently to be desired.

After Dr. Liebenthal had read the foregoing paper at the meeting of the German Association of Gas and Water Engineers, Prof. Bunte commented on it at considerable length. In so far as his remarks on that occasion were not subsequently embodied in his paper on "Incandescent Gas Lighting" at the Paris Gas Congress, we give their substance below:

Prof. Bunte said that the intention was to establish by these investigations what illuminating power was to be expected from good descriptions of mantles at that time, and how much light was obtainable on the average, under normal conditions, from illuminating gas if the gas was burnt in Welsbach instead of in the flat-flame or Argand burners formerly in use. The investigations so far showed that a good, carefully burnt-off mantle, with a consumption of 4¼ cubic feet of gas per hour under a pressure of 12 tenths, afforded an average light of 61½ candles. At first, the light generally exceeded 70-candle power; but after 300 hours' use, it ought not to fall below 52½-candle power, nor to show any appreciable diminution on further use. Having regard to the broad basis on which the investigation was made, its results should have general application. Therefore, on considering the extraordinary enhancement of light which incandescent lighting had brought about in recent years, it would be seen that, in comparison with the old open flame system of lighting, it had effected a cheapening of gas equivalent to reducing it in price to about one-fifth of what it formerly was, while a corresponding improvement in the hygienic conditions had at the same time been attained, since the heat developed, and the quantities of products of combustion, had been reduced in at least equal ratio.

Other points of interest, in addition to the fact that the quality of the gas as shown by photometric tests with flat-flame burners had but little effect on the duty obtainable from the mantles, were the construction of the burner, the air supply, and the pressure under which the combustion took place. The committee limited these first series of testings to gas pressures of 12-tenths to 14-tenths, which were usually obtainable direct from the town services; but it was well known that the illuminating duty increased with the pressure of the gas. Analyses of the mantles showed that all those investigated were made of the Wels-

back type of mixture—*i. e.*, of thorium oxide with about 1 per cent. of cerium oxide. The degree of purity of the components was of supreme importance, for impurities which could barely be detected by analysis appeared to affect to an appreciable extent the illuminating power of the mantle. Great extension of our knowledge of the rare earths had, however, recently taken place, and should lead to valuable results in the production of mantles. The nature of the net which was saturated with the salts of the rare earths also played an important part in the manufacture of good mantles; and more attention was now given to this point than formerly.

The way in which the mantle was burnt off, and the formation of a mantle of good shape, which would not be distorted on long use, were also most important factors. Often the requisite care and knowledge were wanting in these matters. Only a mantle which had been well burnt off and carefully hardened by means of gas under high pressure, would afford good lasting illuminating power. In these investigations, therefore, it had been decided to adopt a uniform method of burning off. Distortion of a mantle removed a part of it from the proper zone of the flame, and consequently brought about a diminution of the light. Dust in the atmosphere also caused a deterioration of the light, by settling on the mantles and contaminating their component material. The investigations described were made for the most part in rooms free from dust, and therefore were not influenced by this disturbing element. The investigations, however, were, so far as possible, made under generally prevalent conditions; and their average results might be taken to represent the lower limit of the duty obtainable from mantles at the present time. The great activity and competition among manufacturers would, he believed, lead to further considerable improvements in mantles within the next few years.

The Municipal Asphalt Plant at Winnipeg, Manitoba.

[By Mr. H. N. Ruttan, City Engineer, Winnipeg, Manitoba.]

There has been not a little agitation in some cities, of late, for the construction of municipal asphalt plants. In Winnipeg, Man., such a plant has been owned and operated by the city for about two years. Late in 1900 the city of Detroit awarded a contract for the construction of the second municipal asphalt plant in North America, and the first one in the United States, to Hetherington & Berner, of Indianapolis, Ind.

The first asphalt pavement in Winnipeg was laid by contract about four years ago. Before the beginning of paving work in 1899, the city bought the stationary asphalt plant erected there by one of the contractors for work previously done. The cost was about $12,000, but this included a 5 ton steam road roller. The old roller proved to be too light for finishing the asphalt, so a 10-ton roller has been bought. The asphalt plant was moved to a new site, where additions and improvements were made. It has been used since for the work of 1899 and 1900. It appears that the chief difficulty encountered has been the securing of asphalt. It has been necessary to use several kinds, which, in turn, has called for much laboratory and experimental work.

The first asphalt used came from Ventura, Cal. The next was also a California asphalt, bought of J. A. Dubbs, of Pittsburg, Pa., and named by him "Obispo." A portion of the latter was crude, the maltha flux being added in Winnipeg, and a part of it was refined. After this, more Ventura and some Alcatraz asphalt was used. During 1900, Dundonald Trinidad asphalt was used, obtained from the Columbia Construction Co., of Philadelphia.

The plant includes two asphalt melting tanks, a sand drum, cold and hot sand elevators, millstone for grinding limestone, a storage tank for hot asphalt, storage bins for ground limestone and hot sand, a mixer of 7 cubic feet capacity, a 60 horse power boiler, 30-horse power engine, air compressor and receiver and various accessories.

The regular force employed to operate the plant numbers an average of 12 men as follows: 1 superintendent, 1 engineer, 2 firemen, 2 asphalt melters, 1 asphalt dipper and mixer, 1 measurer of sand and carbonate of lime, 1 record keeper, 1 man for odd jobs, and an average of 2 sand and limestone shovelers. A daily expenditure of $40 covers the cost of operating the plant for a day of 9 hours, and for producing material sufficient for 1,000 square yards of 2-inch topping, or 1,500 square yards of 1½-inch binder.

The cost of raw materials in 1900 was as follows: Portland cement in sacks, $3.65 per barrel; asphalt, $36 per short ton; sand, $1.35, and broken stone, $1.10 per cubic yard, both on cars; labor, 17½ to 20 cents, and teams, 40 cents per hour. The plant is located close by a railway line.

The net cost of 45,843 square yards of asphalt paving laid in 1899 was $2, and the cost of 22,064 square yards laid in 1900 was $2.064 per yard. This was for a 4½-inch Portland cement foundation, a 1½-inch binder and 2 inch wearing surface.

These unit figures of cost include only the expenditures of the material and labor used in paving, besides which there were charges for maintenance of the asphalt plant and for tools.

In addition, several other items should be taken into account in arriving at a figure of total cost comparable with that for similar work under contract, such as interest, depreciation, taxes, insurance, land rent, and both contractors' maintenance guarantee and profits.

It appears that the practice at Winnipeg has been to separate the asphalt accounts into capital, maintenance and tools, the respective items for 1899 and 1900 being as follows:

Asphalt Accounts, Winnipeg, Man.—Expenditure on Account of:

1899.	Capital	$12,322		
	Tools	202		
	Maintenance	568	$13,152	
1900.	Capital	*733		
	Tools	121		
	Maintenance	†1,048	1.902	
				$15,054

* Chiefly for sand sheds and petroleum residuum tanks.

† Principally for replacing material which was defective when the city bought the plant. It is thought that such heavy items under capital and maintenance as were incurred in 1900 will not be required again, the plant now being in good shape for its present capacity.

It appears from the second foot note to the table that the item entered under 1900 as maintenance should be charged, in part, to capital. Likewise, it is probable that a portion of the outlay for tools in each year should be so charged. In making up the figures presented below we have charged half of each of these three items to capital. Another charge against capital is the new steam roller. This cost $3,500, but we are informed that it is used more on macadam than on ashalt work, and that only one-third should be charged to the asphalt capital account. The teaming having been done by the hour it may be assumed that all the charges under that head are included in the 40 cents per hour, already mentioned.

We may now attempt to determine at least some of the items that should be added to the figures already given as the cost of material and labor for asphalt paving in 1899 and 1900, in order to compare municipal and contract costs. The true capital account is first given, then the various items of current expense, as follows:

Capital Account.

1899.	Original cost	$12,322	
	⅛ cost of road roller	1,200	
	½ cost of tools	131	
		$13,653	
	Depreciation at 5 per cent.	682	
			$12,971

Maintenance, Operation and Capital Charges.

Maintenance	$568
½ tools	131
Interest at 4 per cent. on $13,653	546
Depreciation at 5 per cent. on 13,653	652
Lost taxes	100
	$2,027

Capital Account.

1900.	To balance	$12,971	
	New sheds, etc	733	
	½ tools	61	
	½ old maintenance charge	524	
		$14,289	
	Depreciation at 5 per cent.	714	
			$13,575

Maintenance, Operation and Capital Charges.

½ old maintenance charge	524
½ tools	60
Interest at 4 per cent. on $14.289	572
Depreciation at 5 per cent. on $14,289	714
Lost taxes	100
	$1,970

Summary and Averages.

1899.	48,843 square yards labor and material	$2,000
	" " " capital, maintenance, etc.	42
	Total per square yard, 1899	$2,042
1900.	22,064 square yards labor and material	$2,064
	" " " capital, maintenance, etc.	89
	Total per square yard, 1900	$2,143

The item of $100 for lost taxes is the pproximate amount paid to the city on the plant before its purchase from the former owners. A small rental fee for the land on which the plant stands is included under maintenance. Possibly insurance, if any is carried, is also included under that head. As to the rates of interest and depreciation, we are informed by the city engineer that the city pays 3½ to 4 per cent. on its loans and that depreciation may be reckoned at "between 5 and 10 per cent.; probably not much exceeding the former." Had we taken the highest instead of the lowest figure for depreciation it would have added only some 3 cents per square yard to the final result sf our calculations.

To the revised figures of $2 04 per square yard in 1899 and $2.15 in 1900 our readers may add such items as they think proper for contractor's guarantee and profits and for any contingencies not already considered or for which proper allowance has not been made.

It is interesting to note that two private contractors bid $2.7325 and $2.715 per square yard, respectively, for 16,800 square yards of the pavement laid by the city in 1899, and that one of the same contractors offered to lay 28,300 square yards of asphalt, on another street for $2.47, after the city had decided to buy the asphalt plant.

In our issue of Feb. 21, 1901, we published a table by Mr. F. V. E. Bardol, of Buffalo, N. Y., showing the average cost of asphalt pavements in 47 cities, for the year 1900. In that table the cost for Winnipeg was given as $1.79, instead of the $2.064 cited at the beginning of this article, or the revised figure of $2.15. The discrepancy is explained by the fact that Mr. Bardol's figures for Winnipeg excluded grading and the cost of 3 inches of gravel, beneath the concrete foundation, besides some other small charges.

The average reported cost of asphalt paving in the 47 cities was $2 29. On making various corrections for differences in local conditions a new average of $2.41 was secured, but the new figure for Winnipeg was reduced from $1.79 to $1.76, owing to higher local prices for concrete, which more than offset the lesser thickness of concrete foundation and wearing surface at Winnipeg and also Mr. Bardol's addition of 18 cents to the Winnipeg figures to make up for the lack of the contractor's guarantee for maintenance. The standard for the latter was 10 years, which Mr. Bardol valued at 18 cents per square yard of pavement. It may be added that the concrete in place at Winnipeg cost $5.7482 per cubic yard, or $0.7403 per square yard for a depth of 4½ inches. Also that the length of the working day was 9 hours.

Wanted, A Gas Manager.[1]

By One of the Applicants.

"Wanted, a thoroughly efficient manager for the ——— gas works. * * * Canvassing will disqualify. * * * State salary to," etc., etc. The form of advertisement here outlined may attract but little attention from the majority of the readers of the *Gas World*. If directors of a gas company or members of a gas committee, the chances are that they are well suited in regard to the technical staff at the gas-works. And if salaried officers of gas undertakings it is probable that they are fairly settled; having difficulties and unpleasantnesses to contend with, no doubt, but on the whole preferring to endure the ills they have, by retaining their present position, rather than fly to others that they know not of, by seeking for a presumably better post. But some will read it with particular interest. There are members of boards and of committees who do not feel confident that the man at the head of affairs at the gas works is all that could be desired, and would like to see some improvement, even if it necessitated changes in the staff. And there are many individuals, able to produce good evidence of their capabilities for competently filling the office of secretary, manager, or engineer to a gas undertaking, who are looking for a suitable vacancy.

One might expect that the statement, "Wanted, a gas manager," was literally and absolutely true; but the experience of those who have replied to such advertisements will bear out the assertion that very often it is not so, and that the advertisement is simply a compliance with legal form, or a means of giving an appearance of independence and fairness. A well known authority in gas matters was candid enough to confess that in regard to the sale of stock he advertised in certain papers that did not circulate in financial quarters, with the avowed purpose of merely satisfying the letter of the law. He did not want replies to the advertisement, and did not get any. Now, if persons who advertise, "Wanted, a gas manager," when they really have decided upon the candidate, would follow this plan and send their advertisement to, let us say, the "Sausage Makers' Gazette," instead of the *Gas World*, much trouble and disappointment would be avoided. When, as is often the case, the appointment is practically filled before the copy is handed to the printer, why should a large number, 50 or a 100, or more, of promising candidates be put to the trouble of preparing applications and applying to their friends for written recommendations, or even led to incur traveling and other expenses, under the delusion that their application will be fairly considered without fear or favor? This is a real grievance; for those who are in the unfortunate position of being out of a situation find that even stationery and postage is not a trifling expense.

The candidate has a right to expect, too, that all the conditions specified in the advertisement will be rigidly adhered to. The words, "Canvassing not allowed," or "Canvassing will be considered a disqualification," are frequently used, but in practice are more honored in the breach than in the observance. Sometimes they may convey a warning in an occult way, that it is no use going to much trouble over the application, or that canvassing is superfluous because the members of the board have already come to a decision. But it is not unusual to find that the successful candidate has managed, by hook or by crook, to drive a coach and four through this regulation. Perhaps there is no greater annoyance, when one has accepted an appointment for a personal interview, and given up a day or two's time for the necessary traveling, to say nothing of little expenses that cannot be charged, to find, on arrival, that another candidate came in the day before and has taken the position by storm; that the whole thing is cut and dried, and that the "interview," so far as he is concerned, is a mere farce.

One can quite understand that the director or committeeman does not care to have the privacy of his business or domestic life invaded by shoals of office hunters, and there is no objection to be raised against the regulation. The point is that the advertisement should state nothing that is not absolutely true, and no regulation should be made that is not rigidly adhered to. Persons who are led to unnecessary trouble and expense really have a claim against the advertiser, but the board are quite safe, as people in want of employment are not likely to be in a position to vindicate their rights. Of the man who is out of a job it may truly be said, "Hit him—he has no friends." At times, when changes in the staff are in contemplation, one can readily understand that things get a bit strained; but after making every reasonable allowance, there is room for a little more courtesy and consideration towards the candidates as a whole. The man who replies promptly to an advertisement, giving all required details, is entitled to an equally prompt and straightforward reply, and to have all testimonials, etc, carefully preserved, and returned to him without unreasonable delay. I have applied in answer to advertisements repeatedly, and to this day do not know whether the application got into the right hands or received fair consideration. And in comparing notes with other candidates I find that mine is not a solitary case.

A stranger coming from a distance is at a disadvantage in having no knowledge of local affairs, of the previous history of the concern, or of the habits or proclivities of the directors, as the following instance from my own experience will show. I had been for some years engaged as manager of a 10,000,000 works in a quiet and out-of-the-way part of the country. There was no prospect of advancement; in fact, the town and district were rather going back. I had devoted my spare time to the study of chemistry and engineering, had regularly read the *Gas World*, and endeavored to attain to the standard of smartness and up-to date education that is so frequently pointed out as the requisites of a competent gas manager; but there was no scope for practical experience in extensions or in the erection of modern improvements, such as generator furnaces. Otherwise my position was comfortable, and the relations with my employers satisfactory. The directors met once a month, but the proceedings were very short. The course of events was smooth if sluggish, and I was left a fairly free hand to do the best I could for the concern; and both directors and consumers were satisfied. But I desired a more active life and a larger field of operation, to say nothing of a little more salary. After various

1. *Gas World.*

vicissitudes, some of which have suggested the present remarks, I entered with some feeling of pride and satisfaction upon the management of a 50,000,000 works in another part of the country. True, I was a stranger; but everything seemed fair and straightforward. My new board welcomed me with much urbanity, and the chairman stated that while the concern had hitherto been fairly prosperous, the directors hoped, from the satisfactory character of my recommendations, that there might be still further improvements, and that any effort in that direction would be fully appreciated. This seemed all right and in accordance with my previous experience, and I quite expected that as long as things were kept in order I should be encouraged to do my duty without fear or favor, as in the past.

The plant turned out to be somewhat small, and inadequate to the needs of a steadily increasing business, but that I rather welcomed than otherwise, as affording an opportunity for applying experiences gathered up during the previous 7 years in extending and improving the plant. So I went heart and soul into the preparation of a complete report, dealing with the whole working, and offering suggestions for improving and extending the plant at the least possible expense.

Amongst other things, this report set forth that the coal at present in use was not the best that could be obtained, or suited to the requirements, and that by using a superior coal, which could be had at a very little addition to the price, it might be possible to stave off extensions in the retort house for a year or two. The reading of the report was received with some reserve, that caused me to feel chilled and disappointed, and I soon became aware that there was a mistake somewhere. I did not know at the time that a gentleman sitting at the board was largely interested in the coal supply that had been condemned, that his company had held the contract for many years, and that my predecessor had been accustomed to report favorably on it. One or two of the directors appeared inclined to think that there was something in my ideas. In fact, they did not hesitate to tell me (privately, and outside the board room) that a thing or two had come to their knowledge, from time to time, which supported the views I had expressed. But the coal merchant was an influential man in the district, and in the board room he ruled the roast. The directors who professed agreement with me when they met me in the street sat as quiet as mice at the directors' meeting. They did not care to offend the great man, who could be very disagreeable when he liked, and I soon found that he was quite capable of keeping the coverts on behalf of his coal.

After the reception just instanced the full consideration of the report was postponed to the next meeting. When that came on, an evidence of change was at once apparent. I would have welcomed any fair criticism, being prepared to quote chapter and verse in support of my recommendations. But the chief points in the report appeared to be passed over as not worthy of serious consideration, and it was drily remarked that my predecessor had always found the plant equal to the requirements. Nothing was said to which I could claim to reply, but there was a great deal of innuendo and much tacit opposition that I could not, at the time, understand. Questions as to the difficulty in the way of raising fresh capital were brought forward, and altogether it was evident that not only my scheme, but myself, also, had been effectually blown upon. This line of conduct was persisted in at subsequent meetings, and I could get nothing done, although the demand for gas continued to advance. And after a short time, tired out with continual opposition which I was not in a position to resist, I decided that there was no hope of arriving at a proper understanding that would leave me at liberty to do my best for the proper working of the concern. Things were drifting into a bad way, and I therefore decided to resign and try my luck elsewhere.

It may be of interest to add, in connection with the future of that undertaking, that the whole of the improvements suggested in my report were promptly carried out under my successor. But he knew his way about more than I did, and instead of finding fault with the coal he enlarged on the importance of keeping to one kind when the men had got thoroughly used to it, and the risks of introducing other sorts that might call for very different kinds of treatment in the retort house and also in regard to purification.

After this came a long period of trouble and disappointment. I had broken the long-established connection with my first situation, and the second was not of much use to me. There was evidently a disposition to think more about my not having retained the second place than to appreciate the satisfactory relations at the first. Added to this was the mortification of seeing men, far inferior to myself both as regards experience and character, able to step in before me. One does not mind being beaten fairly, and would cheerfully accept the inevitable if assured that the favored party was really deserving. But this was by no means evident in every case. When opportunity offered, I made a point of soliciting the favorable offices of the selected candidate in the way of informing me what points were successful with the board. But from what I could gather, it would not be safe to lay down any particular rule. It was rather an ability to accurately gauge the ideas of a particular board at the moment, and to strike in with them, that secured success, than the possession of any superiority that would commend itself to any and every board. In one case too much self-assertion would be taken as evidence of knowing too much. In another a studious deference to the wishes of the directors would be taken as an indication of softness and want of backbone. Sometimes the selection was, I will not say a matter of favoritism, but largely due to having a friend in court; and in any case it is a disadvantage if not only the applicant but also his sponsors are entire strangers. I tried advertising, getting recommendations from well known names, writing to promising young managers, who were likely to rise in the world, and so on. Now and then I would get on the short list, but no further. After a time the fact of having been out of a berth for several weeks was an obvious drawback. There was a preference for those who were already in harness, even if it were necessary to wait for some time for the man that was chosen.

At last I managed to hear of a manager who had the offer of a much better position and was anxious to leave at once. His directors were not inclined to let him off until assured of a successor, with the result that both he and his friends were desirous of meeting with some one who would be sufficiently presentable, and able to take up the duties at once. Arranging a personal interview, I succeeded in making a satisfactory impression, and was introduced by the retiring manager to the chairman and one of the directors. After previous experience my equanimity was not greatly disturbed when the situation was advertised in the usual way, though I sympathized with the deluded applicants. My application went forward with some 60 others. I was promptly called upon to attend for a personal interview, and the whole thing was settled in a few minutes, with an ease and celerity that seemed almost ridiculous as compared with the strenuous effort I had been putting forth for many weeks. The undertaking was not a large one, being apparently one of about 20,000,000 cubic feet, and the geographical position was somewhat similar to that of my first appointment, being a quiet, out-of-the-way part of the country. The town was chiefly residential, with none of the go that is characteristic of manufacturing districts.

Profiting by past experience, I determined to know the whole history of the concern and to get used to the ways of the board before pushing forward my own ideas, and in any case determined not to take that course until assured that my own personal advantage would be benefited thereby. I was cautious not to put out too much energy in the way of alterations upon existing practice until assured of how things would be taken, and soon came to the conclusion that excess of zeal would be thrown away. The directors had always paid full dividends and rather plumed themselves upon the fact, though the truth was that this desirable result was secured by the simple expedient of keeping the price of gas up. The charge per 1,000 cubic feet would scarcely stand comparison with other places of the same size, but nothing of this sort was asked for. The directors are men of influence in the little town, and no one cares to offend them, and if a too inquiring customer asks why the gas costs more than at ——— or at ——— he is silenced by a crushing although evasive reply.

The general state of the gas industry, its future prospects and questions relating to new appliances or improvements in manufacture, have no interest for my directorate. They have always done well on the old lines and do not want to do better, while additions to capital are regarded as definite additions to the liabilities, with at best indefinite prospects of increased profit. I soon found that as long as this comfortable state of affairs was maintained no questions would be asked, and, indeed, that anything more is not wanted. The duties are not arduous, and the pay, if not munificent, is sufficient for my modest wants, and so I make the best of it. Occasionally, on reading a stinging article in the *Gas World*, the old war spirit is aroused, and I begin to think about the capabilities of the gas industry, the numerous applications of gas that might be developed by enterprise in the direction of selling at the lowest possible price, the advantage of improved appliances in manufacturing and purifying, and so on. But after calm reflection the question, "*Cui bono?*" always gains the day. Why should I run the risk of raising a powerful opposition by suggesting innovations that, after all, I may not succeed in getting sanctioned.

Analysis of Gas Liquor, Leeds (England) Gas Works.

In a paper on this topic, prepared by Mr. Arthur W. Cooke, at a recent meeting of the Yorkshire Section of the English Society of Chemical Industry, the author said :

Gas liquor as a rule contains from 1.5 to 2.5 per cent. total ammonia, the average being about 2 per cent. It does not generally contain an appreciable quantity of uncombined ammonia, nearly all of it being combined, chiefly in the form of carbonate, sulphide and chloride.

A complete analysis of a gas liquor is not very often performed, as several of the bodies there present are not of technical importance. The chief point of interest to the chemical manufacturer is the total quantity of ammonia which the liquor contains. Next in importance comes the percentage of "fixed" ammonia, by which is meant that proportion of the ammonia in the form of salts which are not volatile at the temperature of boiling water. Another important point in the analysis is the percentage of "free" or "volatile" ammonia. By "free" or "volatile" ammonia is meant those salts of ammonia which are volatile at 100° C. These consist almost wholly of carbonate and sulphide. The term "free" is used in the technical sense, and is not to be confounded with chemically "free" or uncombined ammonia. It is often found necessary to estimate the carbon dioxide and sulphuretted hydrogen, and occasionally the sulphocyanide and ferrocyanide. The other bodies are very seldom estimated.

I thought that it might, perhaps, be of interest to have the figures of the analysis of a sample of the Leeds gas liquor. The sample analyzed represents the whole of the make of the three Leeds gas works for the month of January 1901, and is an average of about 6,000 tons of liquor. The analysis was performed in the laboratory of my firm, Messrs. Brotherton and Co.

The results are stated in grammes per 100 c.c. liquor :

		—to N H_3
Ammonium carbonate	$(NH_4)_2CO_3$	3.397 — 1.203
" sulphide	$(NH_4)_2S$	0.372 — 0.186
" chloride	NH_4Cl	1.261 — 0.401
" sulphocyanide	NH_4CNS	0.093 — 0.020
" sulphate	$(NH_4)_2SO_4$	0 063 — 0.016
" thiosulphate	$(NH_4)_2S_2O_3$	0.384 — 0.088
" ferrocyanide	$(NH_4)_4FeC_6N_6$	Trace — .....
" cyanide	NH_4CN	None — .....
Ammonia derived from other sources (by difference)		.... — 0.031
Total ammonia		.... — 1 945

"Free" ammonia, 1.418 ; "fixed" ammonia, 0.527 ; total sulphur, 0 422 ; "ounce strength," 8 96.

The total sulphur was distributed as follows : As sulphide, 41.47 per cent. ; as sulphate, 3.55 ; as thiosulphate, 33 34 ; as sulphocyanide, 9.24 ; in other forms (by difference), 6.40—100 per cent.

Besides the compounds of ammonia which the analysis shows, there are present in every gas liquor bodies derived from coal tar, chiefly those of the benzine and pyridine series. These, so far as I know, have never been estimated, so that a really complete analysis of a gas liquor has yet to be made. Such an undertaking would be a very difficult one.

I have nothing much to add in the way of new methods for the estimation of the different constituents. Perhaps it will be as well, however, to mention one point in connection with the estimation of the carbon dioxide present as ammonium carbonate. The general method for estimating this body is to add a known quantity of the gas liquor to an ammoniacal solution of calcium chloride, when calcium carbonate is precipitated, thus :

$$(NH_4)_2CO_3 + CaCl_2 = CaCO_3 + 2\,NH_4Cl.$$

This precipitate is then washed and titrated by means of standard hydrochloric acid. If this experiment is performed in the cold, flocculent precipitate is produced, which is somewhat difficult to filter. On warming, the precipitate becomes granular ; but the point is that it should not be boiled or even heated for any length of time, otherwise a reverse reaction will set in, carbonate of ammonia being reformed to some extent, thus :

$$2NH_4Cl + CaCO_3 = CaCl_2 + (NH_4)_2CO_3,$$

and as this body is volatile some of it is likely to be lost.

The general method for the estimation of the sulphuretted hydrogen is to precipitate as zinc sulphide, and treat the precipitate with bromine and hydrochloric acid, after which the SO_3 formed is precipitated by means of barium chloride and the barium sulphate produced is weighed, and the sulphuretted hydrogen calculated from the amount thus obobtained ; or the zinc sulphide is dissolved in hydrochloric acid containing excess of standard iodine, the undecomposed iodine being titrated by means of standard sodium thiosulphate. A quicker method, however, which gives results accurate to the second decimal place, and of quite sufficient accuracy for technical purposes is, I find, to proceed as follows :

Take 25 c.c. of the sample, dilute to about 150 c.c. with water, and distil in an apparatus similar to those used in the estimation of ammonia into about 700 c.c. of water containing sufficient caustic soda to combine with all the CO_2 and H_2S contained in the liquor. This solution is cooled, slightly acidified with acetic acid, and titrated with decinormal iodine.

By this method results may be obtained in a little over half an hour. The other methods take a much longer time.

The residue left in the distilling flask, which amounts to from 10 to 15 c.c. in volume, may then be used for the estimation of fixed ammonia, or for an approximation of the thiosulphate present in the liquor, by acidifying and titrating with decinormal iodine.

There is a method frequently used in estimating the sulphuretted hydrogen in what is known as "concentrated gas liquor," but this does not give good results when applied to ordinary gas liquor. This "concentrated gas liquor" contains about 16 per cent. ammonia, 12 per cent. carbon dioxide, and 3 per cent. sulphuretted hydrogen, but no fixed ammonia, and is used in the manufacture of carbonate of soda. The method consists in titrating some of the diluted liquor in a porcelain basin, by means of a standard ammoniacal solution of copper sulphate, during constant stirring. A flocculent precipitate of copper sulphide is produced, which, as soon as the last trace of H_2S has combined with the copper, becomes granular, and falls to the bottom of the basin. With a little practice a sharp reading may be obtained. In the case of gas liquor, however, the end reaction is not sharp by any means, so that the results are doubtful in value.

Although an appreciable quantity of hydrocyanic acid exists in crude coal gas, it is seldom found in gas liquor. The reason for this is evidently in the fact of the presence of an excess of CO_2, which drives the hydrocyanic acid out of its combination with ammonia.

In entering into large contracts for the purchase of liquor it is usual to tender on the sliding scale, on the basis of the price of sulphate of ammonia—the price rising or falling in proportion to the rise or fall of sulphate. It is usual also in tendering to quote, not in per cent. of ammonia, but in "ounce strength." The term "ounce strength" is a survival of the times when a direct titration was made by means of sulphuric acid, and expresses the number of ounces of strong sulphuric acid necessary to saturate 1 gallon of the liquor. It is not usual now to make a test in that manner. When the figures for ounce strength are required, the number of grams of ammonia per 100 c.c. liquor, obtained by distillation, is multiplied by the factor 4.61, which gives the desired figures.

With the exception of that produced in the large towns, the liquor is sold on tests performed by the Twaddel hydrometer—every degree Twaddel being assumed to be equal to the strength of 2 ounces.

I may say in conclusion that the high figure which has now to be given for the raw material, combined with the high price of fuel, of which, of necessity, a large amount is used in distilling on the large scale (as the liquor contains 50 parts of water to one of ammonia), and the crippling of the outlets for the manufactured products on account of the war, render it necessary for the manufacturer to be on the look out for any improvements which may effect a saving in the working of processes.

Fire Hazards of Heating Systems.[1]

The great diversity of devices and methods in use for house warming, due to the varying conditions of fuel supply and climatic requirements, presents to the underwriter a range of fire hazards which compels the careful study of all the conditions to enable him to suggest to the user the proper safeguards to prevent disaster.

The surveyor or inspector finds his attention called to problems ranging from the old fashioned open fireplace, with wood for fuel, such as grace and make cheerful our country homes, to the wood or coal burning stove, and up to the more modern and complicated steam, hot water and hot air furnaces, now so common in the equipment of city and town houses, with a sprinkling of natural gas grates or stoves, and an occasional encounter with the kerosene oil device, each demanding special expert knowledge as to construction and use, and the exercise of good judgment in the suggestions necessary to make safe such defects as may be discovered upon investigation.

1. *Insurance Engineering.*

Statistics of fire losses from heating appliances seem to place stoves and stove pipes at the head of the list, followed closely by hot air and indirect steam heating devices ; then in regular order, open fires, wood and coal, hot water and direct steam heat ; oil stoves, and last, natural gas. Considering the record of fires from heating apparatus as a whole, the only conclusion to be reached is that carelessness is at the base of each of these accidents, either as a defect in the original installation of the apparatus, or as the result of recklessness and neglect in its after use and care. With a desire to consider briefly some of the salient points of hazard incident to the methods of house warming, we take up the different devices in the sequence of the statistical record as above noted.

Where such devices are to be used for heating or cooking, they should be free from cracks or other imperfections which would admit of the escape of coals or sparks ; should be set upon solid platforms of brick, or in metal pans with raised sides and legs 3 inches in height, in either case being large enough to extend well in front of the ash pit and thus protect the floor. Stoves should not be set within 18 inches nor their pipes within 10 inches of any woodwork, lath or plaster partition or other combustible material, except when conditions will not permit otherwise, and then all combustible material should be protected with bright tin sheeting, with a space of not less than ½ inch between it and the combustible.

Stove pipes should be well and frequently supported by wire ; each joint should overlap the other toward the stove and be carefully riveted to prevent the escape of sparks. Fires should not be dumped into the ash pit except upon a bed of dead ashes of not less than 2 inches thickness. All pipes should enter the chimney or flue horizontally and in plain sight. Pipes entering flues vertically, or passing through blind or unused attics, where they may not be frequently inspected, are prolific causes of fires, particularly in country houses.

The furnace should be set upon a very solid foundation in order to prevent the sagging or cracking of its walls. The top or dome of the enveloping walls should not be less than 18 inches from unprotected woodwork or lath and plaster ceilings, and its smoke pipe or flue should be a like distance from combustibles. The ash pit should be sunken, or the floor in front of it be of brick, stone or concrete, not less than 36 inches wide. The inclosing walls of the furnace should be not less than 12 inches from all combustible material, and the inlet or cold air duct should be entirely of iron or other metal.

Hot air flues or conduits should be made of heavy, bright tin plates with well soldered lock seams, and be kept at least 10 inches from all woodwork or other combustibles. Where it is necessary to carry them through or into wooden or lath and plaster partitions, the flues should be double, *i. e.*, one inside of the other, with an air space of not less than a ½ inch between the two, and be properly braced to insure rigid separation throughout. Where register boxes are set in floors or partitions, the woodwork should be framed around them to leave an air space of not less than 2½ inches, and be protected by flashings of bright tin extending from the outer edge of the register opening to and through the floor beams or partition. Each register should be set in a frame of soapstone not less than 2½ inches wide, and 1 inch thick, firmly and well set in cement or plaster of paris.

At least one of the registers of the system should be so arranged as to insure its being constantly open, either by the removal of the vanes of the valve, or by wiring the same open, so that closing would be impossible. Heater fire pots should be carefully examined before use each season, to discover and remedy defects due to the burning out of their walls, or the destruction of the luting at the joints of the same, whereby coals might fall into the surrounding air space and ignite dust or other combustibles which are liable to accumulate therein.

The same general care in setting and arrangement should be followed as suggested under the item on hot air and indirect steam heating devices, and in addition, all pipes used for the conveyance of hot water or steam should be kept free from contact with woodwork or other combustibles by the use of metal thimbles or sleeves, provided with interior lugs or radial points, to provide an air space where the pipes pass through floors or partitions. Fires from hot water systems occur from the high temperature reached by the water on account of obstructions or retardation of circulation in the pipe system, whereby the heat generated is sufficient to cause the ignition of the wood or other combustible material already partially carbonized by long continued high temperatures. Similar dangers attend the use of direct steam heat, and are augmented by the possibility of the superheating of the steam in the boiler, owing to low water.

The fire record of these devices is largely out of proportion to the number in use for heating purposes, and the only practical method of eliminating the hazard of their presence appears to be that of entire prohibition, as even under the most favorable conditions of use they have proven extremely dangerous.

Heating by this means is restricted to limited areas of the country, and when the supply is sufficient to insure a full supply at constant pressure, the hazards of its use are quite mild, provided the piping has been properly installed and has passed a rigid test for leaks, and the flues for carrying off the products of combustion have been constructed for the purpose. When, however, the supply is weak and restricted, and the consequent pressure variable, the hazard of its use is vastly augmented, for with low pressure and small supply the user is inclined to open the valve in the supply pipe to its fullest extent in order to secure a good blaze ; and when, later, the pressure is increased from any cause, the small blaze is turned into one of great intensity and power, and is liable to ignite combustibles at a distance.

The only practical means of reducing this hazard lies in the use of an automatic high and low pressure regulating valve in the main supply pipe, whereby the flow of gas will be automatically cut off when the pressure either rises above or falls materially below normal, at which it is set to act. Such controlling devices are open to purchase in the districts where natural gas is a factor, and the use of the same should be made obligatory.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Mr. Samuel R. Bullock and associates have purchased the plants of the Kenton (O) Gas and Electric Company. Mr. Bullock is a street railroad operator.

The latest gas news from Oklahoma is to the effect that a charter for the operating of the Guthrie Gas Company has been granted to Messrs. H. W. Painter, George Tipton and Leon Gilbert. The concern is capitalized in $125,000.

Mr. W. H. Sexton, General Manager of the Anniston (Ala.) Electric and Gas Company, writing under date of the 24th ult., says : To the Editors American Gas Light Journal : "Referring to the several discussions in your recent issues regarding the sale of gas stoves, I am induced to write you thereon. We have just had Mrs. Helen Armstrong, of Chicago, lecturing to the ladies of Anniston last week. For a number of years we have sold gas for fuel purposes at $1.25 per 1,000, and have persistently advertised gas stoves, not only for use in the summer but throughout the entire year, and we believe that the greatest obstacle in our way to a larger sale of gas for cooking purposes has been the wastefulness of the average negro cook. These negro cooks are regularly employed in many families where the husband's income is so small that, in the North, the employment of a domestic would be thought extravagant and out of the question. However, the servant problem is getting to be quite a serious problem in the South, as elsewhere, and it was largely for such reason that we retained Mrs. Armstrong to lecture on scientific cooking and to demonstrate how easily good results are secured through the aid of a gas stove. Fortunately, we found that the lady understood her business so perfectly and completely even in her first lecture, as to put herself in thorough accord with her audiences, which were large despite the fact that 'Sam. Jones' was holding revival meetings each afternoon of Mrs. Armstrong's stay. In fact, as Mrs. Armstrong continued to teach, the attendance grew larger and larger. Already her work is beginning to bear fruit, and we feel that even should the result in sales of stoves be not so large as we hoped, we will be amply repaid by the present users of stoves making a better and longer use of them each month. We sell stoves at cost, but have never thought it good business to give them away ; nor would we sell stoves had we not been forced to do so through the indifference of dealers in other lines of stoves. Every year our sale of stoves has grown larger, and we find our best advertisers are those who have used gas stoves."

The gas and electric lighting plants of Corning, N. Y., have been acquired by Mr. A. M. Young and his associates.

The new gas plant fer Lagrange, Ills., has been completed. Messrs. Copley and Strohn, respectively, President and Manager of the going concern, are satisfied over the outlook.

At the annual meeting of the Columbus (O.) Gas Company the following Directors were elected : C. D. Firestone, J. G. Deshler, Geo. W. Sinks, Irvin Butterworth, J. I. Johnson, E. K. Stewart, D. E. Putnam, F. C. Hubbard and H. D. Turney.

MR. FREDERIC EGNER, writing to the JOURNAL under date of May 1, says: To the Editors AMERICAN GAS LIGHT JOURNAL: In the new catalogue of the Laclede Firebrick Manufacturing Company, mention of which is made in your issue of April 29th, there is a misprint to which I would call your kind attention, so that the error may be corrected as far as your readers are concerned. On page 20 of said catalogue, under the headlines of "How Diminution of Illuminating Power is Concerned," the item begins with the statement that "Carbonic oxide (CO)," etc., etc., whereas, plainly, as the succeeding lines show, carbonic acid (CO_2) is meant. It may be well here also to point out that coal gas as a rule seldom contains even 1 per cent. of carbonic acid—generally not over .85 per cent.; so that in practice the taking out of that small per cent., involving sometimes also the removing of some portion of the illuminants, can be ignored. The fact that not 1 per cent. of all the gas companies in the world now use lime as the principal purifying agent, but some preparation of oxide of iron instead, would seem to abundantly prove the above assertion.

THE Western Gas Construction Company, of Fort Wayne, Ind., has been awarded a contract for the installation of its complete system of improved coal gas apparatus for the Jacksonville (Ills.) Gas Light and Coke Company. The apparatus will be up to a capacity of 200,000 cubic feet per diem.

THE Pencoyd plant of the American Bridge Company shipped during March a total of 7,339 tons. We believe this is the largest shipment ever made by any bridge shop in the world.

"R. S." sends the following from New London, Conn.: "At the annual meeting of the New London Gas and Electric Company the following officers were elected: Directors, Robt. Coit, Augustus Brandegee, Henry R. Bond, George E. Terry, James Hislop, A. M. Young and W. G. Bushnell; President, Robert Coit; Vice-President, Augustus Brandegee; Treasurer, A. M. Young; Secretary and Asst. Treas., W. G. Bushnell; General Manager, A. Y. B. Hunt. A concession to the consumers, of 10 cents per 1,000 cubic feet, was ordered."

MR. R. I. SPEAR, Manager of the Pulaski Gas Light Company, of Little Rock, Ark., declares that he will double the output of gas in that city on fuel account this summer as against the output on like account for the summer of 1900; and he means it.

THE proprietors of the Cleveland (O.) Gas Light and Coke Company have purchased a very valuable tract of property on Atlantic street. Its area is a trifle short of 11 acres, and when the time for such act comes the Company will have an ideal site whereon to erect a new plant.

AT a meeting of the Directors of the Jackson (Mich.) Gas Company the following executive organization was perfected: President, H. D. Walbridge; First Vice-President, N. S. Potter; Second Vice-President, Emerson McMillin; Secretary and Treasurer, W. F. Douthirt; General Manager and Assistant Treasurer, Wm. M. Eaton; Asst. Secy., S. E. Wolff.

OWING to continued ill health, Mr. Samuel Hurlbut has resigned the position of General Manager of the Norwich (Conn.) Gas and Electric Company. His successor is Mr. Alexander J. Campbell, of New York.

THE Washington County Gas Company, of Maryland, has been granted a franchise to establish and maintain an acetylene gas plant in Mercersburg, Pa. Under the ordinance the Company will have to furnish gas to the borough authorities for public use without charge.

THE following is from the Utica (N. Y.) *Press*, dated April 27th: "The Equitable Gas and Electric Company, of this city, announces a reduction in the price of gas for illuminating and fuel purposes, and also a reduction in the discount for prompt payment. For illuminating purposes the price is reduced from $1.75 to $1.60 per 1,000 cubic feet. The price of fuel gas is reduced from $1.75 to $1.35 per 1,000 cubic feet. Both are subject to a discount of 10 cents per 1,000 cubic feet for prompt payment. Heretofore the discount for prompt payment has been 25 cents per 1,000 cubic feet. By this new regulation the price of illuminating gas is reduced 15 cents per 1,000 feet to those who do not pay promptly. To those who do pay promptly it makes no difference, as the rate remains $1.50 per 1,000 feet. Those who use fuel gas and pay promptly have paid $1.50 per 1,000 feet, while hereafter they will pay but $1.25, being a reduction of 25 cents per 1,000 feet. The Company also offers to run service pipes into cellars where none now exists; to connect thereon separate meters for both illuminating and fuel purposes; to connect up all gas ranges, without expense, provided gas is used either for fuel or for illuminating purposes. It also offers to sell gas ranges on easy monthly installments, and set the ranges ready for use without additional cost."

AT the organization meeting of the Directors in the Waukesha (Wis.) American Gas Company, the following executive management was named: President, F. H. Putney; Vice-President, A. J. Frame; Secretary, T. W. Haight; Treasurer, Morris W. Stroud.

MESSRS. W. P. COFFEY and J. Clark, of Peoria, Ills., have made a proposition to the authorities of Charleston, Ills., for a franchise to build and operate a gas works there. If we mistake not a franchise on like account for Charleston was granted some months ago to other parties.

THE gas, electric and water companies of Selma, Cal., have been consolidated. The Board of Directors of the combined enterprises may be thus named: D. S. Snodgrass, E. Dudley, S. Sewald, C. Bechtold, J. Brownstone, T. B. Matthews and W. G. Frazier. Mr. A. L. Rice, formerly Manager of the Selma Gas Company, will continue to have charge of the combined interests.

THE properties of the Coshocton (O.) gas works have been acquired by a syndicate, prominent in which is Mr. Thomas Clive Jones, Superintendent and Secretary of the Delaware (O.) Gas Company—it looks almost needless to add that Mr. Jones is also Secretary of the Ohio Gas Light Association. The new proprietors propose to make extensive plant improvements, both as to the generating and main systems, so that the residents (the population of the place has doubled within the last 5 years) will be enabled to obtain sufficient gas for their needs, on any and all accounts. The executive management of the Company is: President, Dwight E. Sapp; Vice-President and General Manager, T. C. Jones; Secretary and Superintendent, J. H. Maxon.

MR. BANKSON TAYLOR has been appointed General Manager of the New Orleans (La.) Lighting Company, which concern has succeeded to the properties of the New Orleans Gas Light Company. The works will be generally improved under the direction of Mr. F. H. Shelton.

THERE is very little doubt that the American Gas Company, of Philadelphia, will acquire the properties of the Bangor (Me.) Gas Light Company, if, in fact, such acquiring has not already obtained.

MR. T. F. LAWRENCE is informed hereby that the properties of the Ohio Gas and Electric Company named by him have been purchased by Mr. Samuel T. Arthur and associates.

A CONTROLLING interest in the stock of the Peoples Gas Light Company, of Rutland, Vt., has been purchased by a syndicate whose active or nominal head is Mr. Leroy W. Baldwin, of New York—he is a son of Mr. W. H. Baldwin, of Rutland. The plant will be rebuilt.

MR. E. B. MOONEY, Manager of the Brockton (Mass.) Gas Light Company, has been authorized to announce a reduction in the selling rates, from $1.75 to $1.60 per 1,000 cubic feet, gross, and from $1.40 per 1,000 to $1.30 per 1,000, net. In October last the Company put into effect a concession of 10 cents per 1,000. The fine American hand of Mr. C. F. Prichard seems to be working; and long may it.

AT a stated meeting of the Incorporations Committee of the Connecticut Legislature one of the subjects discussed was as to the advisability of creating a State Commission (to consist of three members) to supervise the supply of gas and electricity by corporations. Much opposition was manifested, and clever speeches against were made by Gen. John P. Harbison, of Hartford; Mr. Charles H. Nettleton, of Derby; and Mr. Frank E. Brown, of Norwich. Unless positive signs fail, Connecticut will have no State gas and electric commission this year.

DURING the quarter ended March 31, 1901, the United Gas Improvement Company sold in Philadelphia 1,272,294,800 cubic feet of gas.

MR. THOMAS E. GRAY has been appointed to the supervision of the distributing division of the Benton-Harbor and St. Joseph (Mich.) Gas Company.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
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AGENTS:

New York—American News Co. 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, MAY 6, 1901.

The Market for Gas Securities.

Weakness was the prominent feature in the dealings in Consolidated for the week, the closing to day (Friday) being reported at 224½ to 225. The situation locally is in every sense favorable for the Company, but rather distressing to some of its employees. From present indications it would seem that it has been determined to as soon as possible shut down the east and west stations that composed the manufacturing plant of the old Manhattan Company, the output to be kept up through large additions to the water gas plant at Ravenswood, L. I. Other city shares are dull and strong, and those who own Mutual would have little trouble in finding a market for it.

Brooklyn Union shows no change. The stock is steadily held, and we repeat our remark of sometime ago that it should be equal to Consolidated in the rating. Consolidated, of Baltimore, sold up to 63½, and then sagged off to 61¾. It is a good thing to buy, just the same. Peoples, of Chicago, keeps going up the scale, and Washington (D. C.) gas has had a trifling set back from the 300 mark. Cincinnati gas is notably strong. The market today for Peoples, of Chicago, suffered a sharp break, the net loss being 2½ points, with the closing at 115⅜ to 115½. Lacledes are unchanged. United Gas Improvement Company's shares look tempting at 121½ to 121¾. Its annual meeting will be held the 6th inst. The market for bonds continues good.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

MAY 6.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	224½	225
Central Union, Bonds, 5's.	3,000,000	1,000	106½	107
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	120	..
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	350	360
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co.. Bonds, 5's	11,000,000	1,000	109	110
Northern Union, Bonds, 5's.	1,250,000	1,000	104	104¼
New York and East River.. Bonds 1st 5's	3,500,000	1,000	111	113
" 1st Con. 5's	1,500,000	..	106	108
Richmond Co., S. I.	348,650	50	70	..
" Bonds	100,000	1,000		
Standard	5,000,000	100	130	132
Preferred	5,000,000	100	140	151
Bonds, 1st Mortgage, 5's	1,500,000	1,000	116	114
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	218	222
" " Bonds (5's)	15 000,000	1,000	118	119
Bay State	50,000,000	50	1	1¼
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	28½	32
" 1st Mtg. 5's	509,000	1,000	92½	95
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	8	10
" " Bonds, 5's	5,250,000	1,000	75	76½
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000		
Central San Francisco	2,000,000	..	106	108
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati G. & C. Co.	8,500,000	100	209½	210
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	106	107
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	60	65
Preferred	3,026,500	100	84	86
Consumers, Jersey City Bonds	600,000	1,000	102	103
Consumers, Toronto	1,700,000	50	215	216
Consolidated, Baltimore	11,000,000	100	61¾	62⅜
Mortgage, 6's	3,600,000	..	..	115
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	13½	14½
" Con. Mtg. 5's	880,000	1,000	81½	83
Consolidated G. & E. Co.'s., Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50		89
" Prior Lien 5's	5,603,000	1,000	90½	100
Detroit Gas Co., 5's	381,000	1,000	..	89
" Inc. 5's	16,000	100	94	94½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	35	40
Fort Wayne	2,000,000	..	35	41
" Bonds	2,000,000	..	54	58
Grand Rapids Gas Lt. Co..	1,000,000	50	103	105
" 1st Mtg. 5's	1,225,000	1,000	..	..
Hartford	750,000	25	240	250
Hudson County Gas Co., of New Jersey	10,500,000	..	25	..
" Bonds, 5's	10,500,000	..	101	103
Indianapolis	2,000,000	..	55	60
" Bonds, 6's	2 650,000	..	94⅞	95
Jackson Gas Co	250,000	50	70	75
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	101½	103
Laclede, St. Louis	10,000,000	100	85	85⅛
Preferred	2,500,000	100	98	101
Bonds	10,000,000	1,000	..	108½
Lafayette Gas Co., Ind.	1,000,000	100	55	60
Bonds	1,000,000	1,000	56	58
Louisville	2,570,000	50	110	120
Madison Gas & Elec. Co.	400,000	100	62	68
" 1st Mtg. 6's	350,000	1,000	102½	108
" 6 per cent. scrip, due 1910	100,000	25	87	89
Montreal, Canada	2,000,000	100	182	184¾
Newark, N. J., Con. Gas Co	6,000,000	..	..	55
Bonds, 6's	4,600,000		..	103
New Haven	1,000,000	25	280	300
Nashville Gas Lt. Co.	1,000,000	50	110	..
Oakland, Cal.	2,000,000	..	46	47
" Bonds	750,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	115⅜	115½
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	
Rochester Gas & Elec. Co..	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	10,000,000	100	47¼	47⅛
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	82	85
Extension, 6's	600,000	1,000	..	..
General Mortgage, 5's..	2,465,000	1,000	88	90½
St. Joseph Gas Co.	1,000,000	100	36	39
" 1st Mtg. 5's	751,000	1,000	96½	98
Syracuse, N. Y.	1,750,000	100	17	18
Bonds	1,612 000	1,000	83½	9
Washington, D. C	2,600,000	20	290	291
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	100	100	101½
Bonds, 5's	4,000,000	..	106½	107½
Wilmington, Del.	600,000	50	200	201

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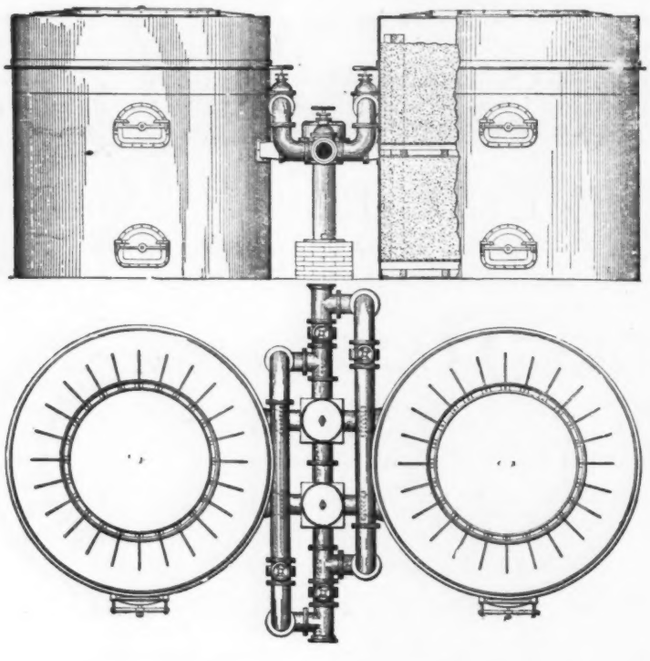

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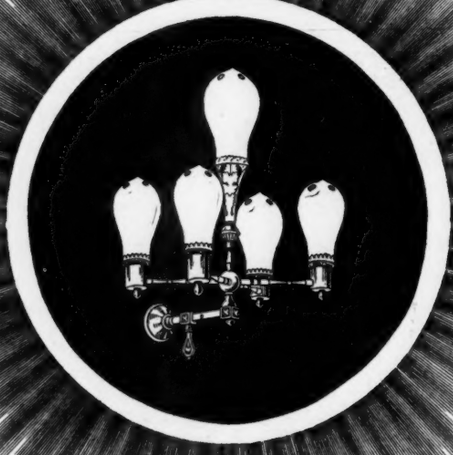

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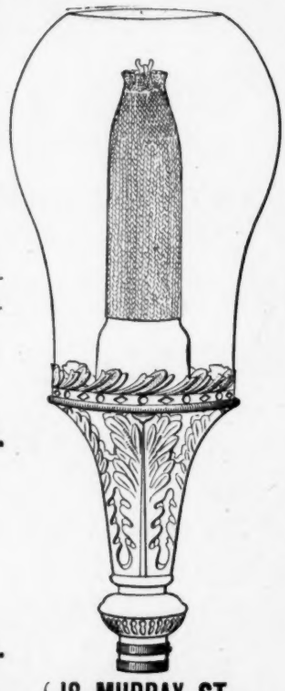

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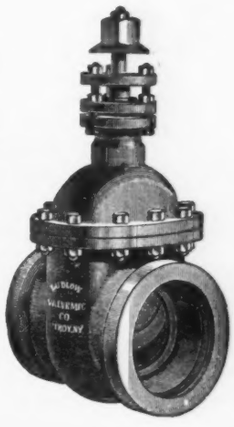

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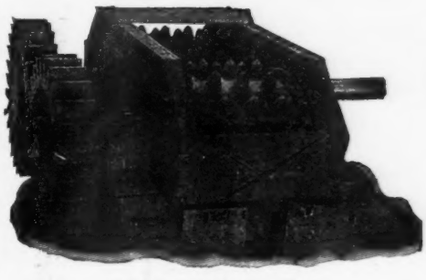

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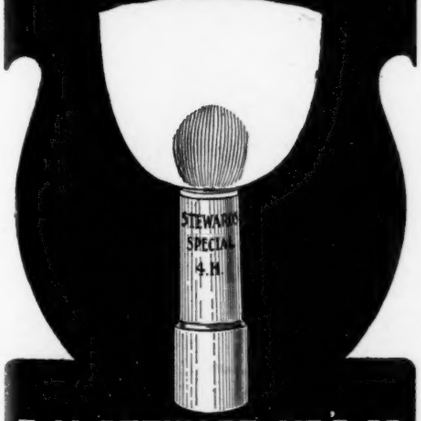

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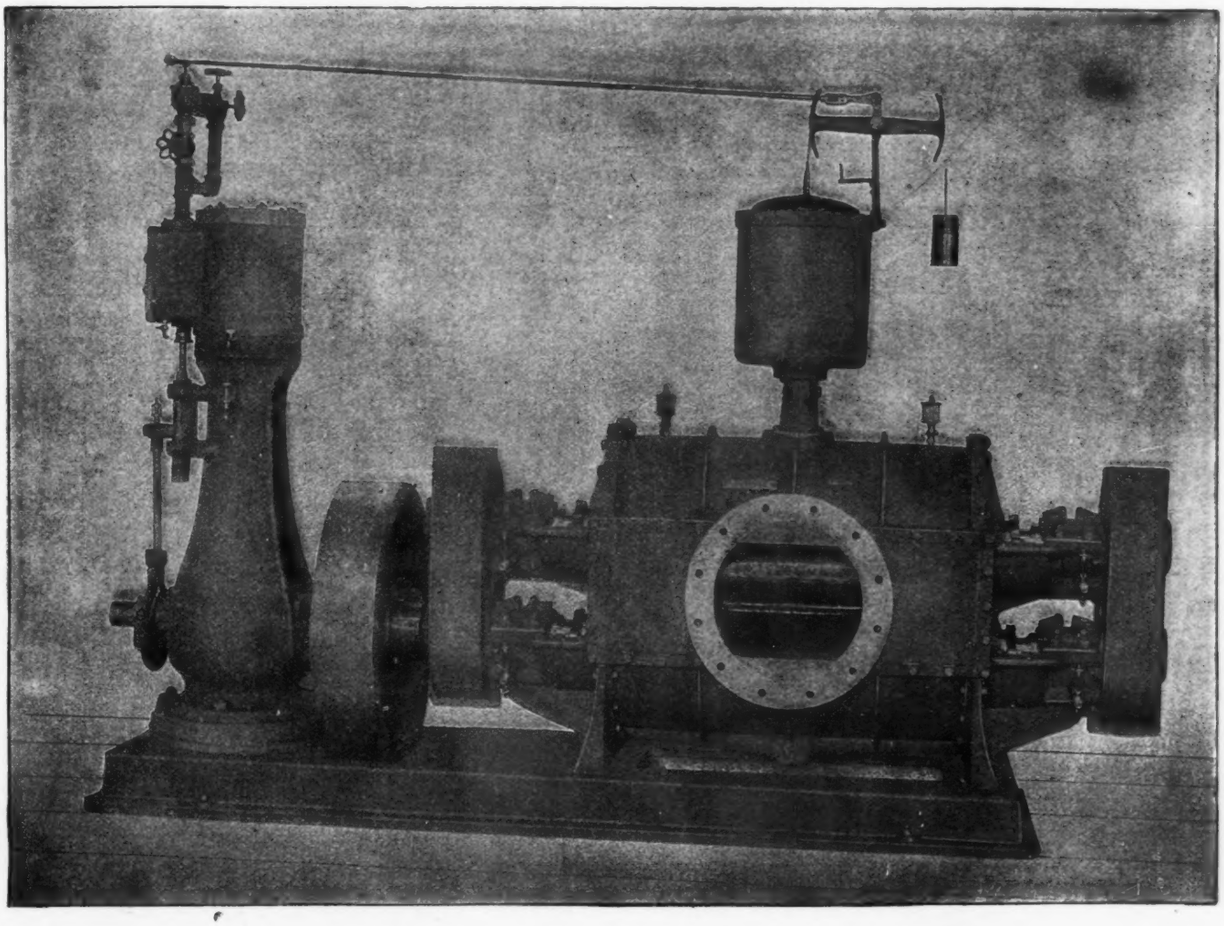

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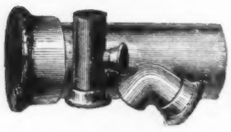

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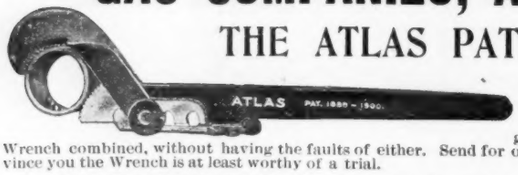

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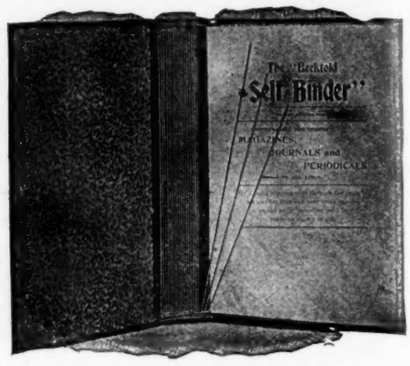

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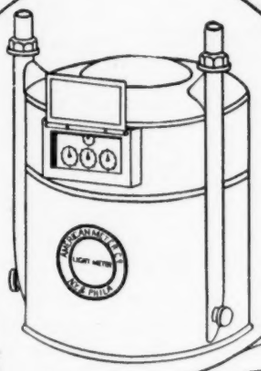

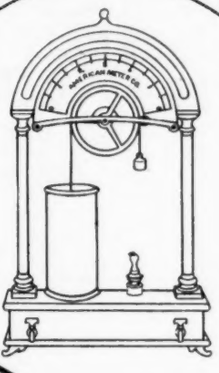

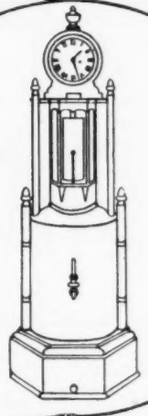

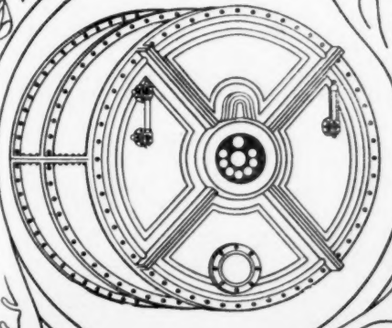

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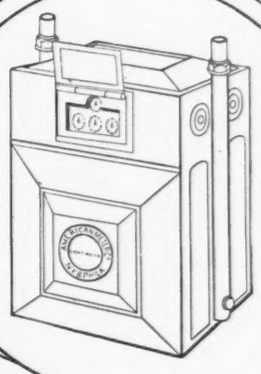
PUBLIC LIGHTING TABLE.

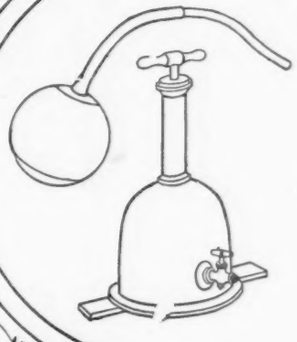
MAY, 1901.

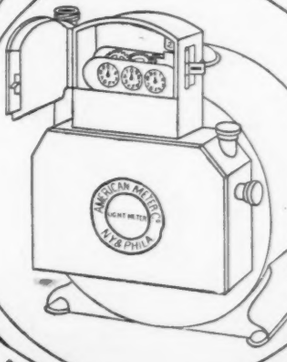
Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Following the Moon. Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. New York City. All Night Lighting. Extinguish.
				P.M.	A.M.
Wed.	1	3.10 AM	4.00 AM	6.45	4.00
Thu.	2	No L.	No L.	6.45	4.00
Fri.	3	No L. FM	No L.	6.45	4.00
Sat.	4	No L.	No L.	6.45	4.00
Sun.	5	7.30 PM	9.50 PM	6.45	4.00
Mon.	6	7.30	10.40	6.45	4.00
Tue.	7	7.30	11.30	6.55	3.40
Wed.	8	7.30	12.10 AM	6.55	3.40
Thu.	9	7.30	12.50	6.55	3.40
Fri.	10	7.30	1.30	6.55	3.40
Sat.	11	7.30 LQ	2.00	6.55	3.40
Sun.	12	7.40	2.40	6.55	3.40
Mon.	13	7.40	3.10	6.55	3.40
Tue.	14	7.40	3.40	7.00	3.30
Wed.	15	7.40	3.40	7.00	3.30
Thu.	16	7.40	3.40	7.00	3 30
Fri.	17	7.40 NM	3.40	7.00	3.30
Sat.	18	7.40	3.40	7.00	3.30
Sun.	19	7.40	3.40	7.00	3.30
Mon.	20	7.40	3.40	7.00	3.30
Tue.	21	7.40	3.40	7.10	3.15
Wed.	22	10.20	3.40	7.10	3.15
Thu.	23	10.50	3.40	7.10	3.15
Fri.	24	11.20 FQ	3.40	7.10	3.15
Sat.	25	11.50	3.40	7.10	3.15
Sun.	26	12.20 AM	3.30	7.10	3.15
Mon.	27	12.50	3.30	7.10	3.15
Tue.	28	1.10	3.30	7.15	3.15
Wed.	29	1.50	3.30	7.15	3.15
Thu.	30	2.20	3.30	7.15	3.15
Fri.	31	No L.	No L.	7.15	3.15

TOTAL HOURS LIGHTING DURING 1901.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	220.10	January	423.20
February	192.30	February	355.25
March	180.00	March	355.35
April	158.30	April	298.50
May	140.40	May	264.50
June	135.40	June	234.25
July	138.00	July	243.45
August	156.20	August	280.25
September	174.40	September	321.15
October	202.30	October	374.30
November	220.40	November	401.40
December	241.30	December	433.45
Total, yr.	2161.10	Total, yr.	3987.45







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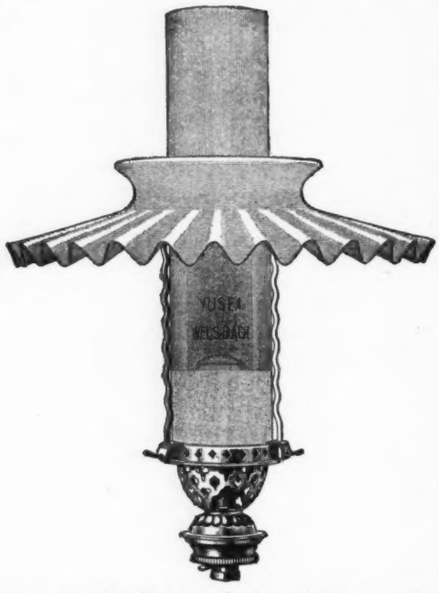

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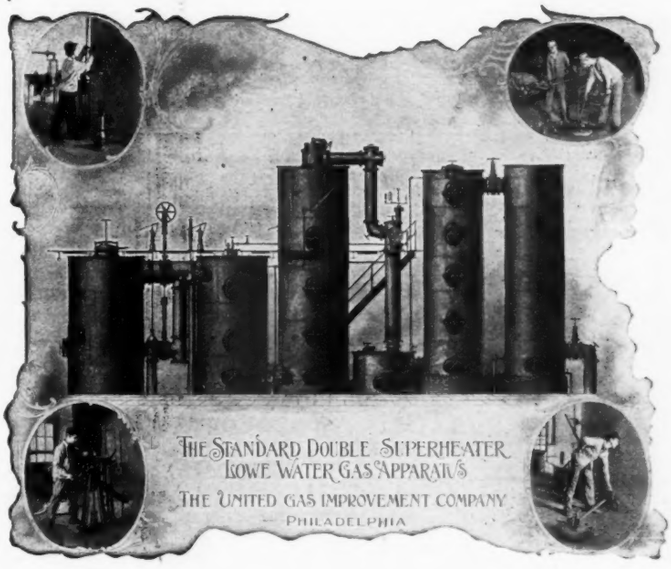
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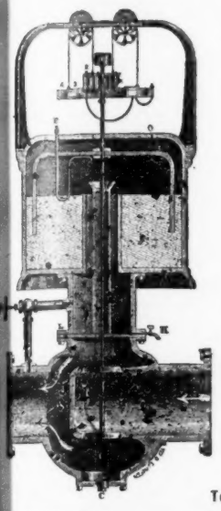

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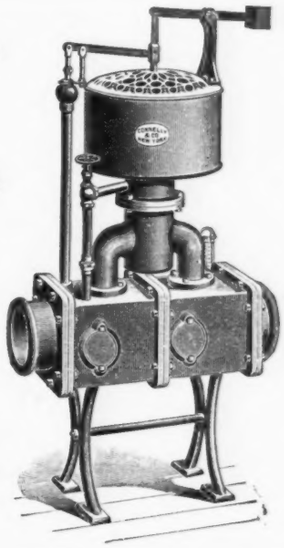

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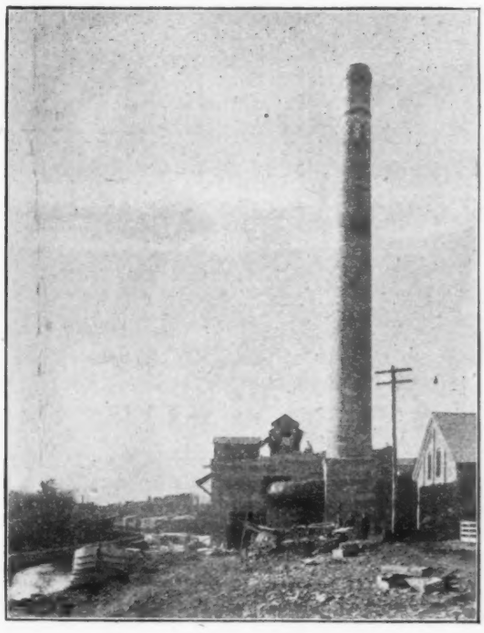

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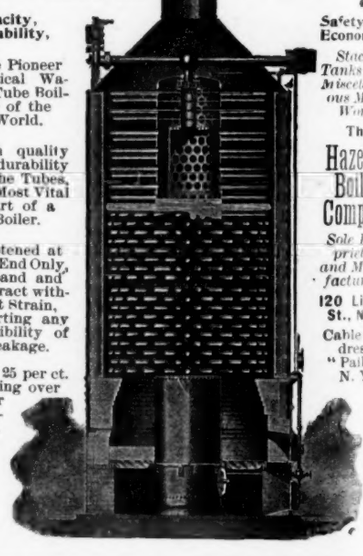

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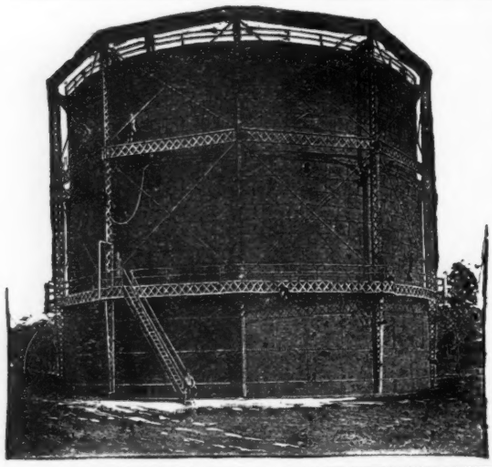

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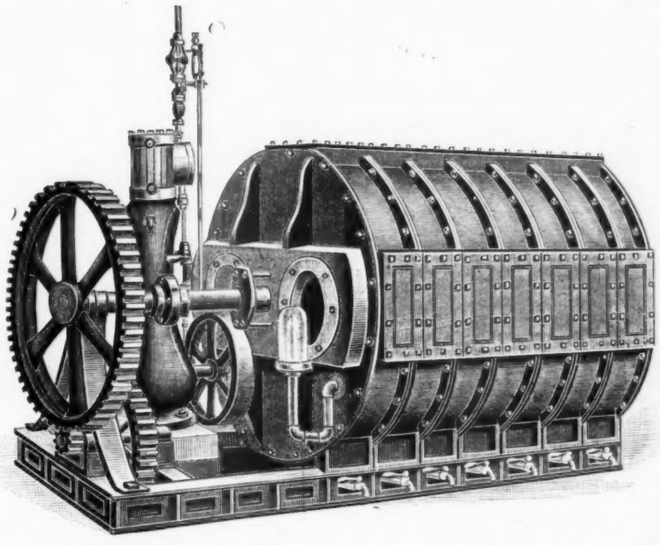

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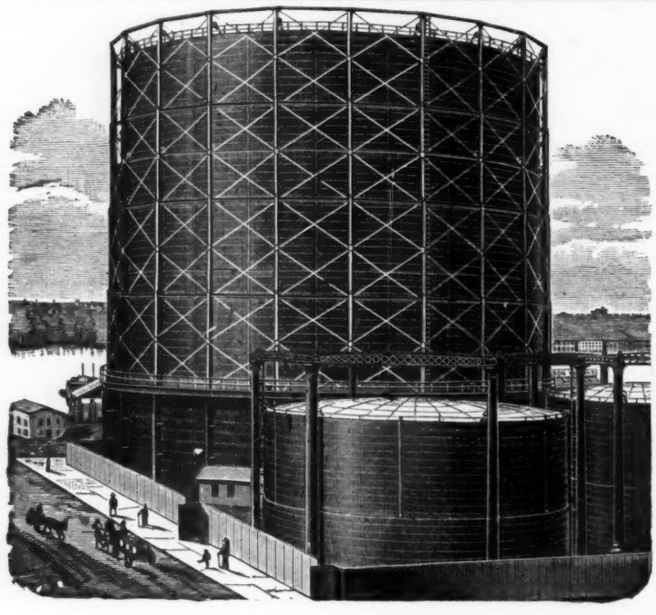

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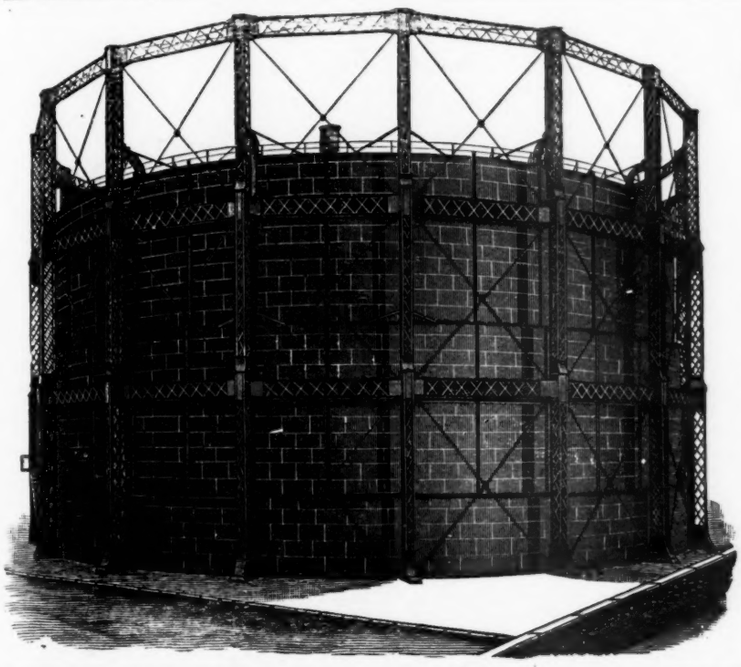

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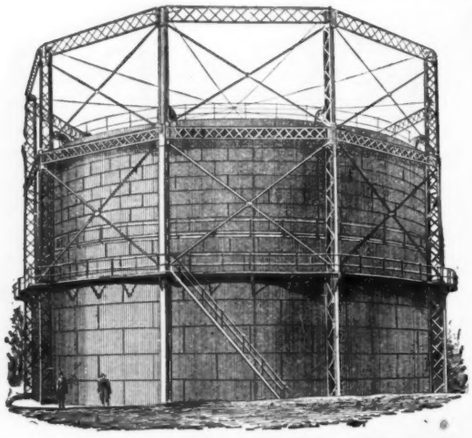

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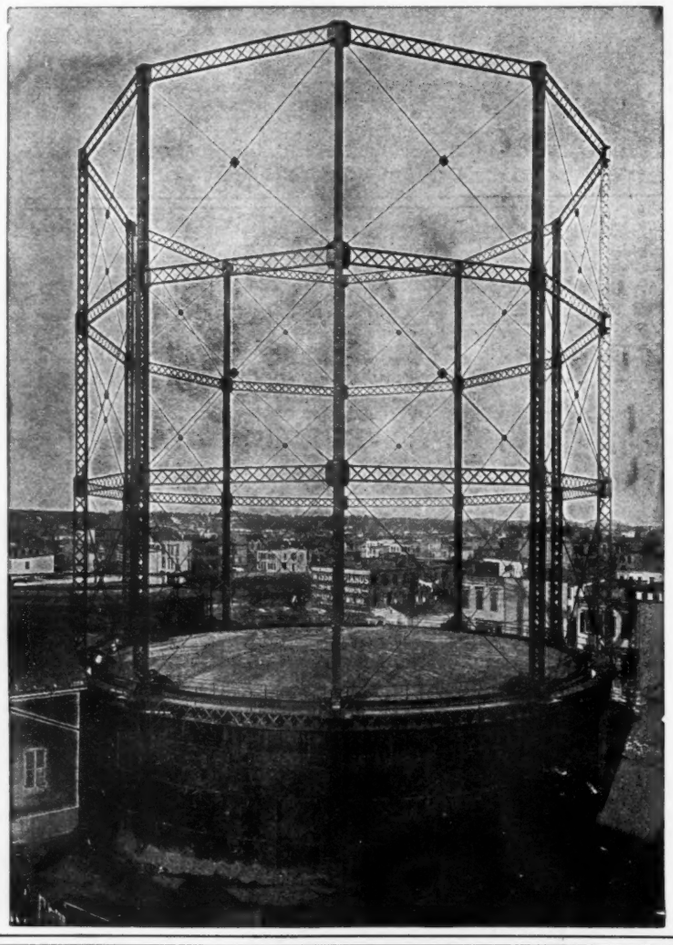

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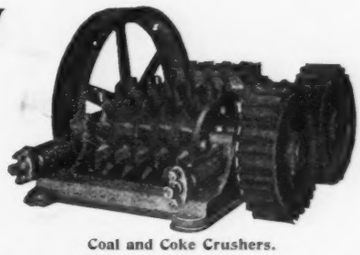

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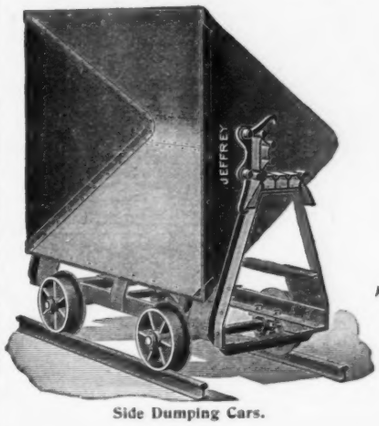

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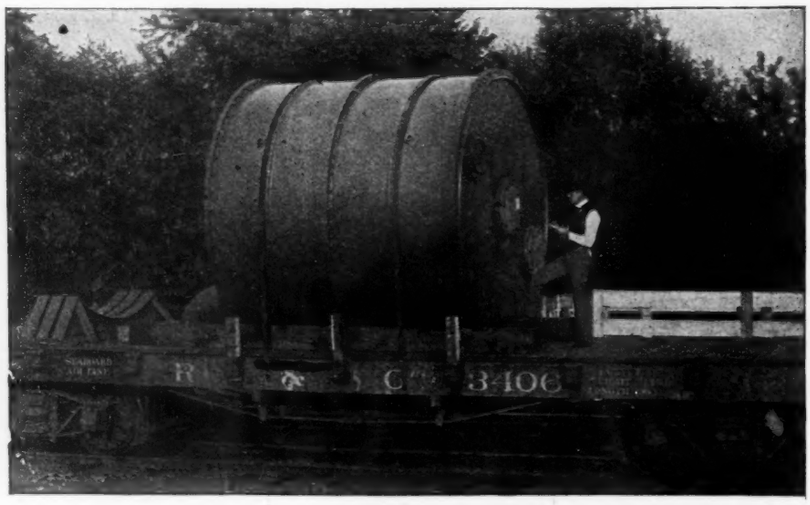

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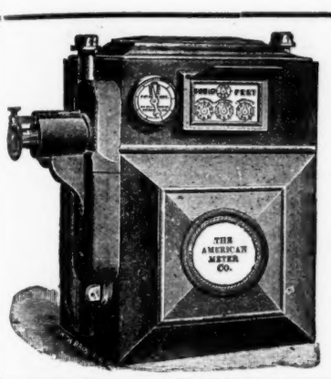

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